

JULY
1955

THERE'S A PHILIPS VALVE FOR EVERY SOCKET

Amateur Radio

Hot off the
production line!



PHILIPS
TYPE
6146
ideal for

*Hamx • Mobile Communications
Base Stations • Low frequency stages
in broadcasting transmitters • Medium to high
power PA systems*

The versatility of Philips type 6146 tube has already made it famous overseas. Check its performance and you'll see why! Under I.C.A.S. conditions a pair in class AB1 will give 120 watts of audio — and it's an efficient tube up to 175 MCs. The wide range of applications of the Philips type 6146 makes it a tube to remember!



1/-



Write for information and data sheets

PHILIPS ELECTRICAL INDUSTRIES PTY. LTD.

69 Clarence Street, Sydney, N.S.W. :: 590 Bourke Street, Melbourne, Victoria

148 Edward Street, Brisbane, Queensland :: 381-5 Murray Street, Perth, W.A.

119 Grenfell Street, Adelaide, S.A.

PV1-55.

Registered at G.P.O., Melbourne, for
transmission by post as a periodical

**THE BEST BY TEST FOR HIGH GAIN
AND HIGH LEVEL AMPLIFICATION**

"HAM" RADIO SUPPLIERS

(KEN MILLBOURN, PROP.)

ANNOUNCE THEIR STOCKTAKING SALE,

BARGAINS GALORE. COMPARE THESE PRICES

PROMPT ATTENTION TO YOUR NEEDS.

NEVER CLOSED BETWEEN 9 A.M. AND 5.30 P.M.

Command Transmitters: Freq.: 4-5.3 Mc., 5.3-7 Mc., or 7-9 Mc.
Complete with valves and crystal £7/10/-

AT5 Transmitters, covers low freq. bands, also bandswitched
3 bands 2-20 Mc. using 6V6 M.O./xtal osc., 807 buffer/dbler.,
pair 807s in parallel; 6V6 grid mod. All stages metered with
0-5 Ma. meter (250 Ma. F.S.D.); complete with all valves,
a gift at £4/17/6

AT5-AR8 Junction Box and Cables £2/10/-

AR8 Cables 7/6 each

AT5-AR8 Aerial Coupling Units, contain one 0-5 Ma. meter
ext. thermo couple, single gang variable condenser, keying
relay, aerial change-over d.p.d.t 12v. 48 ohm relay, etc. Ideal
for wrecking. A Bargain at £1/10/-

Command Receivers, 3-6 Mc. and 6-9 Mc., less genemotor;
air tested £7/10/-

Command Receivers, 150-550 Kc., air tested £9/10/-

Command Receiver Racks, twin, brand new in cartons, includes
two relays, switches, phone sockets, etc. £1

Command Receiver Right-angle Drives £2/6

Command Receiver Flexible Drives, 12 ft. long 11/-

AR8 Receivers, 11 valves, 6 bands, continuous coverage 150
Kc.-25 Mc. BFO, audio controls, calibrated dials £15

AR301 High Freq. Receiver, uses three 954s, one 955, six 6AC7
I.F. stages at 30 Mc. Converts to 144 Mc. Complete, £6/10/-

Canadian type AR301 V.h.f. Receiver, uses 3-954, 1-955, six
6AC7 I.F. stages at 30 Mc. Easily converted to 144 Mc.
New, in case £8/10/- F.O.R.

BC733D Crystal Locked Receiver. Tuning range 108-120 Mc.
I.F. 6.9 Mc. Valve line-up: three 717As, two 12SG7s, one
12SH7, two 12SR7s, one 12SQ7, one 12A6. Also contains six
miniature relays. Packed ready for rail. A gift at £5 each

American Low Freq. and Broadcast Band Receiver, RAX, 7
valves, 4 bands: 200-300 Kc., 300-500 Kc., 500-900 Kc., 900-
1500 Kc. I.F. 160 Kc. Calibrated vernier dial, etc. Ideal
Q5'er. Complete with 28v. genemotor £17/10/-

American ARB Com. Receivers. Freq. coverage in four band:
150 Kc. to 9.5 Mc. continuous. Complete with 24v. genemotor
and control box £17/10/-

THIS MONTH'S SPECIAL

ACR10/VCR139A THREE INCH CATHODE
RAY TUBE, new in carton, Complete with
socket—25/-.

Aust. Wavemeter Type AWB1, high freq. 145 to 165 Mc. approx.
Valve line-up: 958 diode connected into two type 1N5 valves
cascode connected d.c. amp. Complete with spare set of valves
and 3 inch 0-1 Ma. meter. Circuit enclosed. Contained in flat
grey metal carrying case. Packed ready for rail, £5/17/6

U.S.A. L.F.F. Units, comp. with valves, less genemotor, £4/17/6

English L.F.F. Units, complete with valves and 18v. input 450v.
output genemotor. New, only £3/17/6

Meters—0-1 Ma. 2½ in. round, scale 2kv., for use with external
multiplier 35/-

Meters—0-5 Ma. square type, new 27/6

Meters—0-5 Ma. 2 inch round, scale 0-15, 0-250 Ma., A.W.A.
AT5 type, less ext. shunt £2/10/-

Meters—0-100 microamp. heavily damped, brand new. 2½ in.
round. Calibrated 0-1500 linear scale £2/10/-

Meters—0-40, 0-120 Ma., separate connection, new 27/6

Meters—0-20v., 5 Ma. movement, square type, 2 inch, new, 15/-

Meters—0-2.5 Amp. R.F., square type, 2 inch, new 15/-

Meters—0-5 Ma., 1½ Ma. movement, round 2" type, new, 22/6

Phone Plug and Cable (4 ft.) American 4/6

Phone Plug and Cable (6 ft.) Australian 3/6

Modulation Percentage Meters, 2½ in. round, 3 Ma. F.S.D., 35/-

Output Transformers, well known make, 6,000 ohms c.t. to
600 ohms, 40 Ma. Max. level 30 db., new, to clear 35/-

STOCK MUST BE REDUCED! MORE BARGAINS ON PAGE 14

Six volt bayonet type Dial Lamps 1/- each

Coils, small slug-tuned type, suitable for Converters, etc., 3/6

American Headphones, low imped., complete with cable, 25/-

Test Sets A5B. Contains 200 microamp. meter. Valve line-up:
four EF50s, one VR150, one 6B8, two 6X5, one 6H6, one 5Y3.
240v. AC input, 250 HT at 80 Ma., V.R. VR150 supply. Brand
new in carton £7/10/- F.O.R.

American Loran Indicators. Contains 26 valves including 14-
6SN7, 2-6SL7G, 9-6H6, 1-6J87J and 5CP1 C.R.O. tube. Com-
plete with 100 Kc. R.C.A. Xtal and Valves £15

Artificial Aerials, type 21, with line condensers and 100v.,
5-10-20 ohm vacuum type non-inductive load, 6 x 8 x 6 in.
New, in carton £2

5FP2 5 inch electromagnetic deflection with socket housing,
deflecting coils and controls £3

5A MELVILLE STREET, HAWTHORN, VICTORIA

North Balwyn Tram Passes Corner, near Vogue Theatre.

Phone: WA 6465

Money Orders and Postal Notes payable North Hawthorn P.O. Packing Charge on all goods over 10 lbs. in weight, 5/- extra.

AMATEUR RADIO

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

EDITOR:

T. D. HOGAN, VK3HX.

MANAGING EDITOR:

J. G. MARS LAND, VK3NY.

TECHNICAL EDITOR:

K. E. PINCOTT, VK3AFJ.

TECHNICAL STAFF:

J. C. DUNCAN, VK3VZ.

A. K. HEAD, VK3AKZ.

D. A. NORMAN, VK3UC.

COMPILATION:

R. W. HIGGINBOTHAM, VK3RN.

CIRCULATION:

I. K. SEWELL, VK3IK.

ADVERTISING REPRESENTATIVE:BEATRICE TOUZEAU,
96 Collins St., Melbourne, C.I.
Telephone: MF 4505**PRINTERS:**"RICHMOND CHRONICLE,"
Shakespeare St., Richmond, E.I.
Telephone: JB 2419.

MSS. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," C.O.R. House, 191 Queen Street, Melbourne, C.I., on or before the 8th of each month.

Subscription rate in Australia is 12/- per annum, in advance (post paid) and A15/- in all other countries.

Wireless Institute of Australia
(Victorian Division) Rooms' Phone
Number is FJ 6997.

WI BROADCASTS

All Amateurs are urged to keep these frequencies clear during, and for a period of 15 minutes after, the official Broadcast.

VK3WI: Sundays, 1100 hours EST, 7146 Kc. and 2020 hours EST 80 and 144 Mc. No frequency checks available from VK3WI. Intra-state working frequency, 7135 Kc.

VK3WI: Sundays, 1150 hours EST, simultaneously on 2373 and 7146 Kc., 51.015 and 146.25 Mc. Intra-state working frequency 7135 Kc. Individual frequency checks of Amateur Stations given when VK3WI is on the air.

VK4WI: Sundays, 0900 hours EST, simultaneously on 3550 and 14345 Kc. 3550 Kc. channel is used from 0915 hours to 1015 hours each Sunday for the W.I.A. Country hook-up. No frequency checks available.

VK3WI: Sundays, 1000 hours EAST, on 7146 Kc. Frequency checks are given by VK3MD and VK3WI by arrangements on all bands to 50 Mc.

VK3WI: Sundays, 0930 hours WEST, on 7146 Kc. No frequency checks available.

VK1WI: Sundays, at 1900 hours EST, on 7146 Kc. and 146.5 Mc. No frequency checks are available.

Published by the Wireless Institute of Australia,

C.O.R. House, 191 Queen Street,

Melbourne, C.I.

EDITORIAL



AUSTRALIAN RADIO AMATEUR CALL BOOK

Last year the Wireless Institute of Australia completed two years of negotiations to obtain the exclusive rights to publish the list of licensed Australian transmitting Amateurs. The first edition was "on the street" in April, and how it was received by the Amateurs and Short Wave Listeners after so many years without one, is now history.

After a year in circulation the Institute can look back with pride at the success of its first attempt to publish a book of this nature. However, without the loyal support of Advertisers and the sales to Amateurs and Short Wave Listeners, the success of the publication could not have been achieved. To all those people, the Institute says "thank you!"

Although the publication sold well, it was surprising the quantity left over, considering that an up-to-date listing had not been printed for some years. A Commonwealth-wide check on sales figures indicates a fairly high percentage of non-purchasers amongst the DX men, who, according to their own line of thinking, are not so concerned with the names, call signs and addresses of Australian Amateurs as they are with those outside of Australia.

The Institute cannot force each and every member to purchase a copy of its Call Book, although it is not considered infradrig to expect it just the same. The book is not dear ranged alongside most publications today. Every copy sold helps to keep the publication alive, up-to-date and with added attractive sections.

This month—July, 1955—the second edition is available carrying over one thousand changes; every change of address, and altered and new call signs made since the last publication are included.

In addition a new and comprehensive section is included listing all the International Awards for which the DX enthusiast can apply. It is believed that this is the most complete list published in any one journal before, and includes Awards for the Short Wave Listener as well.

This is the first addition to the Australian Radio Amateur Call Book and, it is hoped, the forerunner of a number of proposed sections that will be added annually as each new edition goes to press.

It is your book! Your support will maintain a valuable service not only to Australian Amateurs, but Amateurs all over the world.

FEDERAL EXECUTIVE

THE CONTENTS

Wideband Audio Phase Shift Networks—Part 2	2	Ross A. Hull Memorial V.h.f. Contest 1954-55 Results	12
Modification of MN26 Receivers	5	DX Activity by VK3AHH	15
An Antenna for the S.W.L.	6	Prediction Chart for July, 1955	15
An Accurate Electronic Timer	7	Fifty Megacycles and Above	17
Amateur Call Signs	9	S.W.L. Section	16
Book Review—Radio Amateur's Handbook	9	Federal, QSL, and Divisional Notes	18
Remembrance Day Contest, 1955 ..	11	Correspondence	24

Wideband Audio Phase Shift Networks

PART TWO

BY N. SOUTHWELL,* VK2ZF

THOSE UNUSUAL VALUES

In searching for components of the correct values for the designs worked out (see Part One, previous issue), it is unlikely that you will be able to obtain them exactly. Choose either all your condensers (or all your resistors) as near as possible to the "target" values aimed for, as an error in one pair of components can be compensated for as follows:

In each network there are three pairs of components and the R/C products for these three pairs are the same, i.e. $R_1 C_1 = R_2 C_2 = R_3 C_3$.

Referring to the A network design, $R_1 = 15,000$ ohms
 $C_1 = 0.00714$ uF.

The product of the two = $15,000 \times 0.00714 = 107.1$.

The product of $R_2 C_2$ will be the same, i.e. 107. Product of $R_3 C_3$ will differ if resistance voltage dividers are used on the outputs.

Incidentally, all calculations for this article were done on a slide rule and decimals are only taken to five places, so if there is a slight discrepancy between some of the sets of R/C values for each network don't worry, the error will not be worth considering.

Assume our nearest condenser, measured 0.007 uF. To find the new target value for $R_1 =$

$$\frac{107.1}{0.007} = 15,300 \text{ ohms.}$$

We could, of course, fix the value of R_1 and determine a new value for C_1 —

$$\text{from } C_1 = \frac{107.1}{R_1}$$

All three pairs of components in each network can be treated similarly, but remember the R/C value of the B network pairs will be different to that of the A network.

Yet another method of checking the operation of pairs of components is available to us, once again by the use of the c.r.o. and the audio oscillator. The design frequency for the A network was 1488 cycles, and that for the B network 329 cycles. At 1488 cycles the three pairs of components in network A will give us a 45° phase shift, likewise the pairs of components in network B will behave similarly at 329 cycles.

The test set-up needed for this will be the same as that used to align the type of network used in the G.E. "Ham News" S.s.b. Junior Transmitter and Signal Slicer Receiving Adaptor, which is the next unit to be discussed. The c.r.o. patterns observed will be the same, but the tests must be done at the design frequency of the A and B networks, not forgetting of course to check the c.r.o. to see if phase shift correction is required.

Fig. 8 shows the schematic of the phase shift unit popularised by the articles on s.s.b. equipment in G.E. "Ham News." This unit is one of the simplest and has a lower insertion

loss. It is rapidly gaining in popularity and is manufactured commercially in the U.S.A. by at least one firm and whilst this article was in course of preparation, the writer was informed that one Sydney manufacturer will, upon request, make a kit of precision condensers for this particular phase shift unit available at quite a reasonable figure. The differential phase shift between the outputs can be kept to within $\pm 1.3^\circ$ of 90° when properly adjusted, over a frequency range from 225 cycles to 2750 cycles. This means that over a frequency range of 12:1 the worst suppression obtainable is 39 db., and the average is around 45 db.

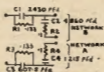


Fig. 8.—Phase Shift Unit popularised by G.E.

This unit is fed from an unbalanced push pull source as will be seen from Fig. 11. The arm of the pot. in the input circuit is grounded and from A to ground the voltage measured with a v.l.v.m. should be 28.57% of that measured from B to ground.

This design incidentally is worked out on the basis that the geometric mean frequency of the audio range is 800 cycles, as against the frequency of 700 cycles used for the design of the lattice networks just dealt with.

In connection with the components of this network, the values of the 0.1 meg. and 0.133 meg resistors should be as close as possible to the ratio of 3:4 to each other, this is more important than their actual value. In VK and ZL, precision 0.05 and 0.1 meg. resistors are available and the above values can be built up using these with little trouble. The 0.133 meg. being obtained by using 0.05 and 0.1 meg. connected in parallel, in series with another 0.1 meg. resistor.

The condensers can be built up by using a fixed condenser of slightly less capacity than that specified, paralleled by a variable padder unit of suitable size, to enable the exact capacity required to be obtained during the alignment procedure.

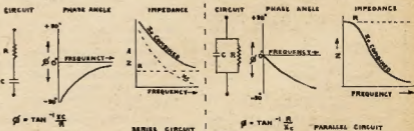


Fig. 9.—Characteristics of Series and Parallel R/C Circuits.

For the easy going, there is an easy way out. Measure all the components on a bridge, obtain the correct values and assemble them. The result will be satisfactory, but the performance of such a network would not be as good as one which was individually aligned. This is brought about by the use of different reference standards for resistance and capacity, the alignment by means of a c.r.o. and oscillator overcomes this difficulty.

Amplitude balance between the two outputs in this design is satisfactorily obtained by varying the cathode bias, and thus the output, of one of the tubes following the phase shift unit, the correction usually required is small. This type of network must be fed directly to the grid of a tube as shown.

To align the networks, wire up the circuit shown in Fig. 10. The transformer used should be of good quality, the ones the writer has seen recommended for use with these networks in the U.S.A. are unobtainable in Australia, but no trouble was had with three transformers tested in conjunction with these units. Feed tone from the oscillator and adjust the arm of the pot. until equal voltages are obtained, between it and points A and B. Check these voltages by use of the c.r.o. With no signal applied to the horizontal input, connect the vertical input in turn between A and B to ground, and adjust the arm of the pot. for equal deflection of the trace in each position.

With the phase shift unit components mounted, but not wired, connect R1 and C1 in series. Then connect the free end of C1 to A, and the free end of R1 to B. With the c.r.o. connected as shown, it can be checked to see if any phase correction is required by connecting leads C and D temporarily to A, having the oscillator set to a frequency of 490 c.p.s. Then move lead D, from A to the junction of C1 and R1, adjust C1 until a circular trace is obtained as described previously. Conduct this adjustment at a low level to avoid overload.

Having obtained the correct pattern, disconnect R1 and C1 and connect R2 and C2 up in series in their place. Move the oscillator frequency to 326.7 c.p.s., check the c.r.o. to see if phase correction is required, and repeat the line-up operation on this pair of components. These four components comprise one network.

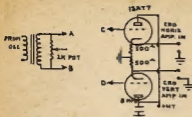


Fig. 10—Test and Adjustment Circuit for Phase Shift Networks. See text for connections to A, B, C, D.

The same procedure is followed when lining up the components of the second network. R3 and C3 are adjusted at a frequency of 1960 c.p.s. and R4 and C4 at 1307 c.p.s.

To check the complete phase shift unit after wiring is complete, use the set-up in Fig. 10, connecting leads A and B to the input and leads C and D to the two outputs. Refer to Fig. 11 for the network connections. Set the oscillator frequency to 1250 c.p.s. and adjust the arm of the pot. until a circular trace is obtained on the c.r.o. Swinging the oscillator frequency now from 200 c.p.s. at 3,000 c.p.s., the c.r.o. pattern should be perfectly circular at 440, 1225 and 2500 c.p.s., wobbling a little from side to side as intermediate frequencies are covered. For use in transmitters, the complete network set up is as shown in Fig. 11.

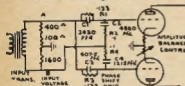


Fig. 11—Complete Circuit of Phase Shift Unit in Fig. 8 connected for use in a Transmitter.

The tapped 100 ohm resistor shown in series with the other two resistors across the secondary of the input transformer should be a potentiometer with the moving arm going to earth.

It will be noticed that the frequencies used in the alignment of this type of network are not round figures. Don't let this worry you if you are after accuracy, as there is a fairly simple way out of the difficulty. The ratio of these frequencies to each other is more important than their actual frequency. All frequencies used are sub-harmonics of 3920 c.p.s. If a stable simple oscillator of fixed frequency is built, whose output approximates the above figure, the main audio oscillator can be set to the frequencies required by feeding both oscillator outputs to the c.r.o. and using Lissajous figures to set the frequency of the variable oscillator. The procedure for obtaining these figures and their interpretation is simple and is covered in most Amateur Handbooks.

There is another type of unit which is similar as far as electrical circuitry is concerned to that of the G.E. unit shown in Fig. 8. However, the ratios that the various components bear to each other is different. The design equations differ from the lattice type network equations given earlier. However, from the design equation for one of these units covering

a frequency range 300-3000 cycles, the following ratios hold good. (For nomenclature refer to Fig. 8, but note, these ratios do not apply to the values given in Fig. 8 for the G.E. network.)

$$\frac{R_1}{R_2} = \frac{R_3}{R_4} = \frac{C_2}{C_1} = \frac{C_4}{C_3} = 1.58$$

$$\frac{I}{R_2 \times C_2} = \frac{1}{R_1 \times C_1} = 3.015$$

$$\frac{1}{R_4 \times C_4} = \frac{1}{R_3 \times C_3} = 11.780$$

To construct one of these units, pick a common value for R1 and R3, or C1 and C3 and calculate the rest of the values from the data above. The input voltage divider in this case had best be solely a pot. of 1,000 ohms or so. The input voltages required will be unbalanced, but a different ratio to those stated for the G.E. network. Adjust the divider, using the set-up in Fig. 10, with a completed unit and a frequency of 1,000 cycles/sec. Using equal gain in each oscilloscope channel, adjust the input pot. until the circular pattern is obtained on the screen. The frequencies for adjustment of the pairs of components will be those where the reactance of the condenser in each pair equals the resistance that goes with it, thus giving 45° phase shift. The test set-up will be as in Fig. 10 and used as for the G.E. network.

For experience gain since the article was first written has proved that the lattice networks are more tolerant regarding operating conditions than the G.E. type networks.

NETWORK CONSTRUCTION

The most popular form of construction appears to be that of mounting the components on a section of "fish back" strip, so that they are readily accessible during initial testing and adjustment. It will be found best to wire up the strip, also attach input, output and earth leads to it before mounting components, then mount the condensers and finally the resistors. This sequence of working gives less chance of the resistors becoming heated accidentally. If carbon resistors are used, they must at all costs be protected from heating.

This is best accomplished by leaving their pigtailed uncut and clamping each one between the jaws of a pair of bull-nose pliers as a thermal shunt, to keep heat away from the components whilst the soldering of that pigtail is taking place. Do not be in a hurry to remove the pliers, wait until the work has cooled. Carbon resistors, upon being heated, change their value. It usually increases by anything up to 20%, and this change is permanent—so be careful.

One watt and half watt rating resistors have been used with no trouble of any sort in a number of networks, some of which have been in use three years and have been stable in all respects. Quarter watt resistors have not been used on occasions the writer has found these to "age" more than the larger rating types. Some brands of resistors have a better reputation for stability than others, these brands are generally known to Amateurs from hard experience. Naturally choose reputable makes of resistors for use in phase shift units.

Should you use wire wound precision resistors, then ignore remarks made concerning avoiding heating the resistors, however be sure your precision resistors are wire wound, there are carbon precision resistors available which have an accuracy of $\pm 1\%$.

Anyone nervous of heating the resistors can easily manufacture a mounting strip using small bolts and nuts, thus obviating soldering the phase shift unit resistors in place.

Condensers used should be mica, or silver mica; postage stamp varieties are quite suitable. Do not use paper or metallized paper condensers. Ceramic dielectric condensers are also unsuitable. Variable condensers, where needed, can be of the mica compression type, used as padder condensers in B/C sets. It is better not to try and make the unit too compact; on more than one occasion the writer has seen whole units wrecked because they became over-heated during soldering, due to their small physical size.

The signal level at which the phase shift units operate is relatively high and no need has been found to shield any to date because of feed back troubles. From a long range point of view, it is best though to mount the unit inside a case, and wire it to a tag strip mounted outside, or to terminals on the case. Then connections to the unit can be altered readily, with no fear of heating up the components.

GENERAL

The close tolerances called for when selecting component values for use in phase shift units has caused concern to nearly all who have thought of building them. If the components vary from the "target" values aimed at, the operating range of the network will shift up or down the audio range. If the components are larger than required the frequency will drop and vice-versa.

Intelligent use of an oscillator and a c.r.o. will eliminate any doubt in your mind as to just what is taking place in a phase shift unit. Remember that components can be split up into pairs and checked, as described previously, should you have reason to believe that something is wrong with the operating characteristics of any network. The information in this article should be sufficient to enable you to trouble-shoot any type of unit.

The differential phase shift of the two networks (i.e. the phase difference between their outputs) depends upon the accuracy of their components. The ratio of desired to undesired sideband depends also upon this accuracy, which is really how much the phase shift difference in the two network outputs depart from the 90° figure aimed at. The ratio of the two side bands can be obtained from the formula—

$$\frac{\text{undesired sideband}}{\text{desired sideband}} = \tan \left(\frac{D}{2} \right)$$

where D = the deviation in degrees from 90° between the two outputs.

At different frequencies in the operating range, the deviation will be different (remember how a perfect circle trace in the c.r.o. cannot be obtained over the whole operating range). This formula can be used to obtain the side-

(Continued on Page 12)

ZEPHYR MICROPHONES



"THE MICROPHONE THAT SPEAKS FOR ITSELF"

TYPE "80"

A high quality Moving Coil Microphone of striking appearance and fidelity.

- Ideal for transmission of voice or music.
- Good appearance.
- Solid cast case, finished in stoved black enamel, full tilting head.



TYPE "80"
MOVING
COIL

TYPE "8XA"

A quality Crystal Insert with "Zephyrfil" filter.

- Durable chrome steel cage.
- Hand or stand pattern.
- Good high frequency response.
- Full tilting head.



TYPE "8XA"
CRYSTAL



TYPE "40"
RIBBON

TYPE "40"

A high grade Studio Microphone, reasonably priced, for those requiring high fidelity.

- Imported magnets, highly efficient generator.
- Fully protected against dust and filings.
- Rotatable cage—360°.
- Chrome copper cage, black bakelite base, and steel gimbles.



TYPE "90"
MOVING
COIL

TYPE "90"

Precision built Moving Coil Generator provides good quality reproduction.

- Light weight, durable chrome and baked enamel metal case.
- Full tilting head.
- Excellent sensitivity.
- Robust construction.

AUSTRALIAN MADE — — FOR AUSTRALIAN CONDITIONS

Manufactured by—

ZEPHYR PRODUCTS PTY. LTD.

58 HIGH STREET, GLEN IRIS, VIC.

(Box 2, Armadale P.O., Vic.)

Phone: BL 1300

AVAILABLE FROM ALL LEADING TRADE HOUSES

Modification of MN26 Receivers

BY S. T. CLARK,* VK3ASC

THESE receivers were manufactured in quantity during the War by Bendix Radio for use in aircraft as part of MN31 Automatic Radio Compass equipment.

From time to time numbers of these receivers have been available inexpensively on the disposals market. They are of superlative construction and cover a useful frequency range.

The modifications to be detailed are as follows:

- (1) The receiver is for use as a car radio.
- (2) A.c. powered for use as a b.c. receiver in the shack, or as an i.f. channel following either a converter or a receiver such as the EC348.
- (3) Readers are referred to "QST" for December, 1952, "A Bargain Novice Station." This deals with the conversion of an MN26Y for use on 80 metres and the addition of a simple one-valve trans-

mitter operated from a built-in power supply.

Fig. 1 shows the circuit of an MN26 Receiver as modified for a.c. operation.

Since this receiver was originally designed for operation as part of an A.D.F. system, it contains components which are not necessary for Amateur use.

1.—As Car Radio

For use as car radio where installed genemotor is to be used or other suitable type (230v. 70 Ma. will be sufficient) substituted, in this case the components L7-1, L7-2, C9-1, C9-2, L8, C37-2, and C37-3, which comprise the i.v. hash and h.t. filters, should remain. Also the tuning motor will be found to operate satisfactorily on half its normal voltage. Since it is expected that owners will wish to mount the set in the boot of the car, where full remote operating facilities are desired, this too should remain. The set can then be operated from the MN28 Remote Control Unit which

should be mounted near the driving position.

The other alternative, one which will be more attractive to many, is to make the modifications along similar lines to those described in section 2, using the space so vacated to accommodate the few components which remain in the rear section of the chassis and mount the genemotor in some other convenient location.

If this is done the physical size of the receiver can be greatly reduced by such a re-arrangement and the cutting off of the rear portion of the chassis and the cutting down of the case to accommodate it.

The receiver can then be mounted in any convenient position in the front of the car. VK3AFA has modified a number of these receivers, mounting some of them beneath the front seats of certain cars.

2.—For Broadcast Reception

To modify the receiver for broadcast reception the following components are

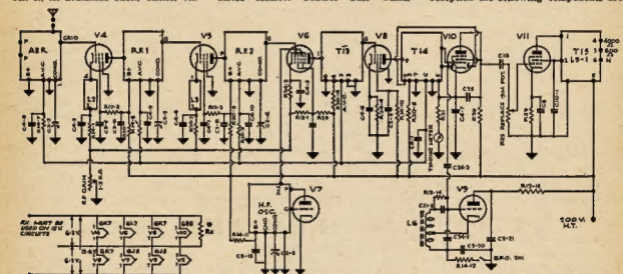


Fig. 1.—MN26 Receiver Circuit modified for a.c. operation.

*Rx.—For 12v. operation as follows: 6F6 15.75 ohms, 6K6 63 ohms, 6V6 42 ohms, or number 46 pilot lamp.

- C1-1 to C1-15—5-25 pF. variable.
C1-1 to C2-5—5 section variable, 125-400 pF.
C3-1 to C3-11—0.05 uF. 400v. d.c.w. mica.
C4-1 to C4-11—0.05 uF. 300v. d.c.w. mica.
C5-1, C5-2—0.1 uF. 200v.
C6-1, C6-2—0.12 uF. 200v.
C7-1, C7-2—0.1 uF. 400v. oil.
C8-1, C8-2—3 section, 0.5 uF. 100v. d.c.w.
C9-1, C9-2—35 pF. N580K 500v. d.c.w. ceramic.
C10-1, C10-2—35 pF. 500v. d.c.w. ceramic.
C11-1 to C11-3—35 pF. N580K 500v. d.c.w. ceramic.
C12-1 to C12-3—35 pF. 500v. d.c.w. ceramic.
C13-1 to C13-3—35 pF. 500v. d.c.w. ceramic.
C14-1, C14-2—0.005 uF. 2% tol., 300v. d.c.w. mica.
C15-1 to C15-3—0.001 uF. 500v. mica.
C16-1 to C16-3—0.001 uF. 500v. mica.
C17-1 to C17-3—0.001 uF. 500v. mica.
C18-1, C18-2—250 pF. 5% tol., 500v. d.c.w. mica.
C19-1, C19-2—10 pF. 500v. d.c.w. ceramic.
C20-1 to C20-4—100 pF. 500v. mica.
C21-1, C21-2—100 pF. 500v. d.c.w.
C22-1, C22-2—75 pF. 500v. d.c.w. mica.
C23-1, C23-2—75 pF. 500v. d.c.w. mica.
C24-1 to C24-3—6 pF. 500v. 10% tol., ceramic.

- C25-1 to C25-3—5 pF. mica.
C26-1 to C26-3—5 pF. mica.
C27-1 to C27-3—5 pF. mica.
C28-1 to C28-3—5 pF. mica.
C29-1 to C29-3—5 pF. mica.
C30-1 to C30-3—5 pF. mica.
C31-1 to C31-3—5 pF. mica.
C32-1 to C32-3—5 pF. mica.
C33-1 to C33-3—5 pF. mica.
C34-1 to C34-3—5 pF. mica.
C35-1 to C35-3—5 pF. mica.
C36-1 to C36-3—5 pF. mica.
C37-1 to C37-3—5 pF. mica.
C38-1 to C38-3—5 pF. mica.
C39-1 to C39-3—5 pF. mica.
C40-1 to C40-3—5 pF. mica.
C41-1 to C41-3—5 pF. mica.
C42-1 to C42-3—5 pF. mica.
C43-1 to C43-3—5 pF. mica.
C44-1 to C44-3—5 pF. mica.
C45-1 to C45-3—5 pF. mica.
C46-1 to C46-3—5 pF. mica.
C47-1 to C47-3—5 pF. mica.
C48-1 to C48-3—5 pF. mica.
C49-1 to C49-3—5 pF. mica.
C50-1 to C50-3—5 pF. mica.
C51-1 to C51-3—5 pF. mica.
C52-1 to C52-3—5 pF. mica.
C53-1 to C53-3—5 pF. mica.
C54-1 to C54-3—5 pF. mica.
C55-1 to C55-3—5 pF. mica.
C56-1 to C56-3—5 pF. mica.
C57-1 to C57-3—5 pF. mica.
C58-1 to C58-3—5 pF. mica.
C59-1 to C59-3—5 pF. mica.
C60-1 to C60-3—5 pF. mica.
C61-1 to C61-3—5 pF. mica.
C62-1 to C62-3—5 pF. mica.
C63-1 to C63-3—5 pF. mica.
C64-1 to C64-3—5 pF. mica.
C65-1 to C65-3—5 pF. mica.
C66-1 to C66-3—5 pF. mica.
C67-1 to C67-3—5 pF. mica.
C68-1 to C68-3—5 pF. mica.
C69-1 to C69-3—5 pF. mica.
C70-1 to C70-3—5 pF. mica.
C71-1 to C71-3—5 pF. mica.
C72-1 to C72-3—5 pF. mica.
C73-1 to C73-3—5 pF. mica.
C74-1 to C74-3—5 pF. mica.
C75-1 to C75-3—5 pF. mica.
C76-1 to C76-3—5 pF. mica.
C77-1 to C77-3—5 pF. mica.
C78-1 to C78-3—5 pF. mica.
C79-1 to C79-3—5 pF. mica.
C80-1 to C80-3—5 pF. mica.
C81-1 to C81-3—5 pF. mica.
C82-1 to C82-3—5 pF. mica.
C83-1 to C83-3—5 pF. mica.
C84-1 to C84-3—5 pF. mica.
C85-1 to C85-3—5 pF. mica.
C86-1 to C86-3—5 pF. mica.
C87-1 to C87-3—5 pF. mica.
C88-1 to C88-3—5 pF. mica.
C89-1 to C89-3—5 pF. mica.
C90-1 to C90-3—5 pF. mica.
C91-1 to C91-3—5 pF. mica.
C92-1 to C92-3—5 pF. mica.
C93-1 to C93-3—5 pF. mica.
C94-1 to C94-3—5 pF. mica.
C95-1 to C95-3—5 pF. mica.
C96-1 to C96-3—5 pF. mica.
C97-1 to C97-3—5 pF. mica.
C98-1 to C98-3—5 pF. mica.
C99-1 to C99-3—5 pF. mica.
C100-1 to C100-3—5 pF. mica.

- R1-1 to R1-15—50,000 ohms, ¼ watt, 10% tolerance, ceramic.
R16-1, R16-2—3,000 10% tolerance, ¼ watt.
R17-1, R17-2—1,000 ohms, ¼ watt ceramic.
R18-1 to R18-3—5,000 ohms, ¼ watt.
R19-1—200,000 10% tolerance.
R20-1 to R20-3—¼ megohm, ¼ watt.
R21-1 to R21-3—¼ megohm, ¼ watt.
R22-1 to R22-3—¼ megohm, ¼ watt.
R23-1 to R23-3—¼ megohm, ¼ watt.
R24-1 to R24-3—400 ohms, ¼ watt.
R25-1 to R25-3—400 ohms, ¼ watt.
R26-1 to R26-3—400 ohms, ¼ watt.
R27-1 to R27-3—400 ohms, ¼ watt.
R28-1 to R28-3—400 ohms, ¼ watt.
R29-1 to R29-3—400 ohms, ¼ watt.
R30-1 to R30-3—400 ohms, ¼ watt.
R31-1 to R31-3—400 ohms, ¼ watt.
R32-1 to R32-3—400 ohms, ¼ watt.
R33-1 to R33-3—400 ohms, ¼ watt.
R34-1 to R34-3—400 ohms, ¼ watt.
R35-1 to R35-3—400 ohms, ¼ watt.
R36-1 to R36-3—400 ohms, ¼ watt.
R37-1 to R37-3—400 ohms, ¼ watt.
R38-1 to R38-3—400 ohms, ¼ watt.
R39-1 to R39-3—400 ohms, ¼ watt.
R40-1 to R40-3—400 ohms, ¼ watt.
R41-1 to R41-3—400 ohms, ¼ watt.
R42-1 to R42-3—400 ohms, ¼ watt.
R43-1 to R43-3—400 ohms, ¼ watt.
R44-1 to R44-3—400 ohms, ¼ watt.
R45-1 to R45-3—400 ohms, ¼ watt.
R46-1 to R46-3—400 ohms, ¼ watt.
R47-1 to R47-3—400 ohms, ¼ watt.
R48-1 to R48-3—400 ohms, ¼ watt.
R49-1 to R49-3—400 ohms, ¼ watt.
R50-1 to R50-3—400 ohms, ¼ watt.
R51-1 to R51-3—400 ohms, ¼ watt.
R52-1 to R52-3—400 ohms, ¼ watt.
R53-1 to R53-3—400 ohms, ¼ watt.
R54-1 to R54-3—400 ohms, ¼ watt.
R55-1 to R55-3—400 ohms, ¼ watt.
R56-1 to R56-3—400 ohms, ¼ watt.
R57-1 to R57-3—400 ohms, ¼ watt.
R58-1 to R58-3—400 ohms, ¼ watt.
R59-1 to R59-3—400 ohms, ¼ watt.
R60-1 to R60-3—400 ohms, ¼ watt.
R61-1 to R61-3—400 ohms, ¼ watt.
R62-1 to R62-3—400 ohms, ¼ watt.
R63-1 to R63-3—400 ohms, ¼ watt.
R64-1 to R64-3—400 ohms, ¼ watt.
R65-1 to R65-3—400 ohms, ¼ watt.
R66-1 to R66-3—400 ohms, ¼ watt.
R67-1 to R67-3—400 ohms, ¼ watt.
R68-1 to R68-3—400 ohms, ¼ watt.
R69-1 to R69-3—400 ohms, ¼ watt.
R70-1 to R70-3—400 ohms, ¼ watt.
R71-1 to R71-3—400 ohms, ¼ watt.
R72-1 to R72-3—400 ohms, ¼ watt.
R73-1 to R73-3—400 ohms, ¼ watt.
R74-1 to R74-3—400 ohms, ¼ watt.
R75-1 to R75-3—400 ohms, ¼ watt.
R76-1 to R76-3—400 ohms, ¼ watt.
R77-1 to R77-3—400 ohms, ¼ watt.
R78-1 to R78-3—400 ohms, ¼ watt.
R79-1 to R79-3—400 ohms, ¼ watt.
R80-1 to R80-3—400 ohms, ¼ watt.
R81-1 to R81-3—400 ohms, ¼ watt.
R82-1 to R82-3—400 ohms, ¼ watt.
R83-1 to R83-3—400 ohms, ¼ watt.
R84-1 to R84-3—400 ohms, ¼ watt.
R85-1 to R85-3—400 ohms, ¼ watt.
R86-1 to R86-3—400 ohms, ¼ watt.
R87-1 to R87-3—400 ohms, ¼ watt.
R88-1 to R88-3—400 ohms, ¼ watt.
R89-1 to R89-3—400 ohms, ¼ watt.
R90-1 to R90-3—400 ohms, ¼ watt.
R91-1 to R91-3—400 ohms, ¼ watt.
R92-1 to R92-3—400 ohms, ¼ watt.
R93-1 to R93-3—400 ohms, ¼ watt.
R94-1 to R94-3—400 ohms, ¼ watt.
R95-1 to R95-3—400 ohms, ¼ watt.
R96-1 to R96-3—400 ohms, ¼ watt.
R97-1 to R97-3—400 ohms, ¼ watt.
R98-1 to R98-3—400 ohms, ¼ watt.
R99-1 to R99-3—400 ohms, ¼ watt.
R100-1 to R100-3—400 ohms, ¼ watt.

removed from the chassis together with their associated wiring.

Loop tuning circuits, V1, R7, C4-1, C5-2, R14-13, R19-2, C12-2, C4-2.

Phaser, C39-1, R12-10, R12-11, C39-2, R21, R22-1, R22-2, R15-1, R15-2, C3-14, R23, R14-6, C3-16, R21, R18, C2-1, V2, R14-2, R27, R14-1, R12-12, R1, C4-11, R12-13, R36a and b, R34-1, L7-1, L7-2, C9-1, C9-2, C37-1, C37-2, C37-3, C10-2, L8, R12-9, R22, V12, T16, C5-2, L9-2, R13-2, C39-3, R24-5, R19-1, R22-3, C5-1, R32 and C7.

If the filaments are wired as shown on the circuit, then the filament wiring can be conveniently connected for operation either from a 6.3v. or a 12.6v. source. I feel that it is now time to discuss the mechanical changes which are

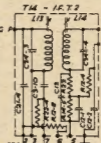
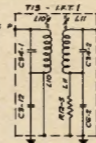
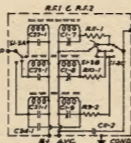
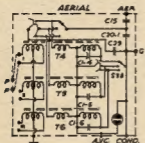
necessary. Since the receiver has a fine reduction gear drive built into it, the writer felt that it should be used. A false front, folded from 16 gauge aluminum sheet, was therefore made as one would a chassis, the lips being folded in at the bottom for half an inch. The whole thing was made the same size as the original front panel and 1 1/2" in depth.

This permitted a cutout to be made for a dial which was made from a sheet of perspex 1/8" in thickness to which was cemented a sheet of drawing paper (the solvent for perspex is chloroform). The dial is fixed to the shaft by a single 5/32" machine screw tapped axially into it after the assembly has been

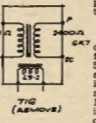
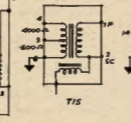
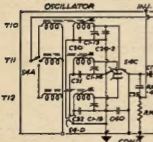
turned so that the drive enters horizontally from the right hand side.

If there is no spliced adapter available for the drive one can easily be made by drilling a shaft extension so that it is a force fit onto the male spline or, if the hole in the extension is too large, the cupped end can be filled with molten solder and pushed on before the solder has time to harden. A cap threaded internally to screw on and hold this in place is a decided advantage, but not essential.

In my case I had a meter of the correct type and this was mounted in the top l.h. corner of the front panel. R.f. gain bottom l.h. corner and the a.f. gain shaft passed through the panel in a similar position on the front r.h.s. On



(R21-C32-2 C33-2 C34-2 C35-2 C36-2 C37-2 C38-2 C39-2 C40-2 C41-2 C42-2 C43-2 C44-2 C45-2 C46-2 C47-2 C48-2 C49-2 C50-2 C51-2 C52-2 C53-2 C54-2 C55-2 C56-2 C57-2 C58-2 C59-2 C60-2 C61-2 C62-2 C63-2 C64-2 C65-2 C66-2 C67-2 C68-2 C69-2 C70-2 C71-2 C72-2 C73-2 C74-2 C75-2 C76-2 C77-2 C78-2 C79-2 C80-2 C81-2 C82-2 C83-2 C84-2 C85-2 C86-2 C87-2 C88-2 C89-2 C90-2 C91-2 C92-2 C93-2 C94-2 C95-2 C96-2 C97-2 C98-2 C99-2 C100-2)



the l.h. edge of the false front were placed the antenna jack and two phone jacks for 600 ohm and 4,000 ohm outputs. The power lead was also entered through a grommeted hole in this edge.

Power Supply

This is entirely conventional and consists of 80 Ma. 285-0-285 volt transformer, choke, rectifier and two 10 uF. 500v. electrolytic capacitors. The power supply is mounted in the vacant space in the rear of the chassis, and there is sufficient space available to fit, say, a 100 Ma. supply which will give sufficient extra capacity to operate a converter.

AN ANTENNA FOR THE S.W.L.

BY NORMAN BURTON*

ONE of the hardest problems to solve for the s.w.l. is "what sort of antenna shall I erect?" Books on the matter offer an intriguing variety and a close study of them results merely in increasing the already existing confusion in one's mind. The fact that the s.w.l. is normally a multiband fan, adds yet more confusion to a problem already very murky. What, then, to erect?

The antenna offered has been in daily use since 1946 in two continents—Europe and Australia—and can fairly claim to be well tried. It is the acme of simplicity to erect and shows a gain over a 132-foot Marconi, or the length of wire so beloved of s.w.l.s., of 4 to 6 S points on the S meter of the receiver and it is literally true that signals can be read on it that are completely inaudible on the other previously men-

tioned antennae. No attempt will be made to explain why or how it works; the writer did once try and work this out, but the effort gave him a violent headache and in consequence the attempt has not been repeated.

It is a version of the Windom and works excellently over the range 10 to 160 metres; it has not been tried on 5 metres, but did work well on 45 to 50 Mc., receiving the East Coast U.S. f.m. stations during 1947-8 most satisfactorily on a Hallicrafter S27 receiver.

To erect the antenna cut the top 33 feet long and tap on the feeder a third the distance from one end, i.e. at 11 feet from one end. The feeder is 41 feet 6 inches long and it is recommended that this length be adhered to, as it has been found to be an optimum length. If you must alter the feeder length, do so in lengths of 16 1/2 feet so as to maintain the feeder an odd number of quarter

waves long with respect to 10 metres, but if possible try and keep to the recommended dimensions.

It will not be found too hard to dispose neatly of 42 feet of feeder, it sounds a lot but once the antenna is in the air you will be surprised how the feeder seems to shorten. A few bends appear to have no effect on performance, but the writer arranges that the first eight or nine feet of feeder hang down at right angles to the antenna.

As regards best direction; in Europe, East and West was found to be best, and though the writer's runs East and West here, it might be better North and South. Of course if you can, put up one in each direction. The antenna has been used with a wide variety of receivers from a 0-V-1 to 19-tube supers and works well with all of them, so now just rush out and get it up, you won't be disappointed I assure you.

* Assoc. W.I.A., BKHS11494; 143 The River Road, Revesby, N.S.W.

BY R. BARNETT*

It will provide accurate delayed switching of any circuit of up to 200 watts capacity, the delay being variable from one half second to 85 seconds through five ranges. The original, built by the author, is accurate to plus or minus one twentieth of a second, and could probably be improved beyond this by the use of better quality components, as it was built "from the junk box."

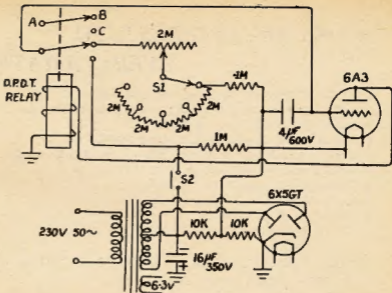
The power supply transformer is a standard type with a 6.3v. filament winding and a 150 volts aside 80 Ma. high tension secondary. The condenser shown in the circuit as 4 uF. 600v. should be of as high a voltage rating as possible; 600v. being considered the minimum, as any leakage will affect the accuracy of the timer. A paper block type is most suitable.

The switch shown as S1 is an ordinary five position wafer type, while S2 is a push button type, normally open. Connections A, B and C may be connected as desired, depending on whether the circuit is to be normally open or closed. Connection through A and B will give a normally open circuit, closing during the timing period.

In use, the unit should be allowed to warm up for about 20 minutes. Approximately 30 seconds after switching on, the relay will close. The 2 meg. control is then set to the desired position and S2 momentarily closed, when the relay will open and remain so for the pre-set time.

To calibrate the timer, you will have to buy, beg, or borrow a **self starting** electric clock with a sweep second hand. This is connected in series with points A and B. By setting the 2 meg. control and S1 to various positions, the clock will indicate the corresponding time delay when S2 is closed. A suitable dial can be marked out accordingly, and the timer is ready to be put to work.

* VK9 Associate, Station Street, Cressy, Vic.



RIGHT OFF
THE PRESS!

The Australian Radio Amateur CALL BOOK

Available now from—
Divisions of W.I.A. and
Leading Booksellers in
each State.

THIS 1955 EDITION CONTAINS—

- An up-to-date listing of Station Call Signs and Addresses of Licensees of Transmitting Stations located in the Commonwealth of Australia and its Mandated Territories including the new Z Call Signs.
- Over one thousand additions, alterations and deletions of last edition.
- World-wide Awards available to Amateurs and Short Wave Listeners.
- Up-to-date list of Australian Broadcast Stations and their frequencies.
- Drilling information—all necessary data for drilling and tapping.

Order Your Copy Now—4/6

PUBLISHED BY THE WIRELESS INSTITUTE OF AUSTRALIA

(ALL RIGHTS RESERVED)

BOOKS OF INTEREST TO EVERY AMATEUR OPERATOR

★ RADIO AMATEURS' HANDBOOK, 1955 Edition	44/3	plus 2/- postage
★ AMER. RADIO AMATEUR CALL BOOK MAGAZINE (covers world)	44/3	2/-
★ ANTENNA HANDBOOK—A.R.R.L.	25/-	1/3
★ RADIO AMATEURS' MOBILE HANDBOOK—"CQ"	26/6	1/-
★ SINGLE SIDEBAND FOR THE RADIO AMATEUR—A.R.R.L.	25/-	1/-
★ WORLD RADIO HANDBOOK FOR LISTENERS	15/9	1/-
★ WILLIAMSON AMPLIFIER MANUAL	6/-	6d.
★ AMPLIFIER MANUAL—KENDALL	6/-	6d.
★ PHILIPS VALVE MANUAL	10/6	9d.
★ SOUND REPRODUCTION—BRIGGS	27/6	1/-

SEE OUR TECHNICAL BOOK DEPARTMENT FOR THE LARGEST RANGE OF RADIO AND TELEVISION BOOKS AVAILABLE. MAIL ORDERS BY RETURN.

McGILL'S Authorised Newsagency

Est. 1860

183-185 ELIZABETH STREET, MELBOURNE, C.I, VICTORIA.

"The Post Office is opposite"

Phone: MY 1475-7

**AEGIS RADIO
COILS & PARTS**
do a grand job for you!

WITH WINTER COMING, you'll want to get down to it and build your own high quality amplifier or radio equipment. But be sure you stipulate AEGIS components from your favourite dealer. AEGIS is top in quality and performance. Here are some from our range.

AEGIS MIDGET COILS AND LF. TRANSFORMERS	Type M24 Aerial Shielded Perm. Iron Core.
	Type M25 R.F. Shielded Perm. Iron Core.
	Type M26 A Osc., Shielded Perm.—6ANT.
	Type M28 B Osc., Shielded Perm.—6REG.
LF. TRANSFORMERS	Type M29 C Osc., Shielded Perm.—IRE.
	Type M30 D Osc., Shielded Perm.—6AES.
DUAL WAVE KITS	Type J22 General Purpose 455 Kc. Midget Perm.
	Type J30 Battery 1-4 valve 455 Kc. Midget Perm.
	Type J9 Standard 455 Kc.
	Type K1M Midget Dual Wave for 6ANT or 6AES only. Size: 3/4 x 1 1/4 x 1 1/4 inches.

For full technical information write to—

AEGIS MFG. CO. PTY. LTD.
208 LIT LONSDALE STREET, MELBOURNE, VIC.

Telephone: FB 3711 (3 lines)

If difficulty experienced obtaining supplies, contact nearest Aegis Distributors:
N.S.W.: STL. AUST.: QLD.: WEST. AUST.:
Watkins Wynans, Geo. Procter, Chandlers, A. J. Wyle,
Nth. Sydney, Adelaide, Brisbane, Perth.



TUNING KNOBS, Large and Small, Bakelite.
RESISTOR STRIPS
PACKAGED HARDWARE

CERAMIC INSULATORS
Complete range of stand-off and feed-through types.

AMATEUR CALL SIGNS

FOR MONTH OF APRIL, 1953

These amendments are included in the latest issue of the Australian Radio Amateur Call Book.

NEW CALL SIGNS

- VK—** New South Wales
 20H—H. C. Harman, 35 Glenzie St., Raymond Terrace.
 2AMT—J. R. Howard, 18 Clarke St., Earlwood.
 2ATB—F. R. Gale, 8 Churchill Cres., Cammeray, Sydney.
 2ATP—J. Parkes, 77 Fenwick St., Bankstown.
 2ZAZ—G. Harriman, Station Farm 1836, Lake Wyanang, Griffith, Postal: P.O. Box 1837V, Griffith.
 2ZNN—A. D. Nutt, 12 Austral Bldg., Anzac Parade, Maroubra.

- Victoria**
 3AFU—J. K. Fullagar (Dr.), 34 Sackville St., Kew, E.4.
 3AHQ—H. Denver, 5 Reid St., Murrumbidgee.
 3APH—P. E. Playford, Station: 112 Webster St., Ballarat; Postal: C/o Police Barracks, Russell St., Melbourne.
 3AZR—P. C. Ryan, 10 Seymour Gr., Camberwell, E.2.
 3ZAV—P. D. Ward, "Barrabool House," Highton, Geelong.
 3ZBJ—G. B. Jennings, Station: C/o. Mrs. M. Hamilton, 37 Eyre St., Reservoir, Postal: 18 Royal Eds., Parkville.

- South Australia**
 5FC—J. W. Millard, P.O. District Council Office, Brindley St., Crystal Brook.
 5KD—D. F. Dawson, 8 Trinity Cres., Salisbury North, Adelaide.
 5LJ—J. R. Lewis, C/o. D.C.A. Mess, Box 376, Darwin, N.T.
 5ZAK—G. A. Tidy, 49 Belcombe Ave., Flinders West.

- Tasmania**
 TIB—I. G. Gillies, Post Office, Dover.
 TRG—R. Garth, C/o Hydro Electric Commission, Trevallyn, Launceston.

- Territories**
 1JW—J. L. Ward, Mawson, Antarctica.
 1VH—F. A. Van Hulsan, Mawson, Antarctica.
 3CK—M. H. Ewen, P.O. Box 56, Port Moresby.
 3EW—W. W. Ewen, P.O. Box 56, Port Moresby.
 3FP—F. C. Penick, C/o. Australian Petroleum Co. Pty. Ltd., Port Moresby.

CHANGES OF ADDRESS

- VE—** New South Wales
 2AI—D. E. Matton, 18 Russell Street, Vaucluse.
 2IF—G. W. Thornton, 5 Fredben Ave., Cammeray, North Sydney.
 2QD—R. H. Dixon, Cr. Hagie St. and Prune Lane, Lavington, via Albury.
 2RT—M. F. Tierney, 71 Telopia Ave., Caringbah.
 2TN—D. J. Scott, 43 Brax St., Inverell.
 2ZS—W. J. Smith, Alfred Oval, Leichman St., Young.
 2ABU—A. M. Dan (Dr.), 80 Carr St., Coogee.
 2ADB—A. C. Cheetham, C/o R. Bennett, 8 Belmore Rd., Penrith.
 2AED—E. L. Colyer, Station: Vessel M.Y. "Tiki".
 2ALF—W. L. Harris, 58 Brook St., Coogee.
 2ANZ—J. F. Shortall, Flat 4, 180 Ocean St., Edgecliff.
 2AQE—K. F. Turner, Lake Albert Rd., Wagga.
 2ARA—W. N. Short, Station Lot J1 Government Rd., Beacon Hill; Postal: 22 Auburn Rd., Auburn.
 2AVT—J. J. Fairleigh, Lot 36 Hushkins Ave., Dubbo.

- Victoria**
 2EJ—W. J. Bennett, Albert Hill Rd., Lilydale.
 2FTH—D. D. Paine, Thomas St., Frankston.
 3OX—J. W. Watson, 5 Newbiggin St., Burwood, E.13.
 3QY—C. W. Richardson, 1153 Nepean Highway, Chesham, E.22.
 3QG—B. F. D. Page, Ashby Way, Kilgirth.
 3AAC—W. R. Clifton, Flat 4, "Lumeau," Hughenden Rd., East St. Kilda.
 3AGC—G. C. Miller, 23 Malvern Rd., Prahran.
 3AEW—C. G. G. Washford, Cr. Jacks and McNamara Sts., Ferny Creek.
 3AMI—R. E. A. Grigson, 40 Bowman St., Mordialloc.
 3AST—S. J. Lloyd, "Tullamore," Humphries Rd., Frankston.

- Queensland**
 4DI—L. W. Effeney, 221 Dawson Rd., Rockhampton.
 4FH—J. F. Bull, Flat No. 4, Oella's Bldg., Victoria St., Mackay.
 4LT—A. E. Carter, 65 Dickenson St., Carina, Brisbane.
 4MC—A. D. Macpherson, 913 Gynple Rd., Chermside, Brisbane.
 4WT—N. J. C. Walling, Macknade Mill, Ingham.
South Australia
 5AP—R. R. Hodgson, 11 Wood St., Selmonstown, Port Pirie.
 5MW—K. J. Atkins, Laffers Rd., Blackwood.
 5ST—R. T. Southwood, Station Private Residence 1/2 mile NE of O.T.C. Station VIDI, Darwin, N.T. Postal C/o P.O., Darwin, N.T.
 5UF—R. Fenwick, 1 Spark St., Port Augusta.
Tasmania
 6CK—C. M. Hayes, 278 Pearson St., Osborne Park, Perth.
 6KL—H. Leaver, Wetheroon.
 7FM—T. F. Moore, 66 Lochner St., West Hobart.

CANCELLED CALL SIGNS

- VK—**
 2ABQ—K. G. Hawkins.
 2ADR—B. A. Smalley.
 2AVP—E. Penick, Now VK3VP.
 3SF—R. Garth, Now VK3GP.
 3ADB—J. G. Du Faur.
 3AGK—K. G. Horne.
 3ASV—R. J. Stevens.
 4ED—K. A. Taylor.
 4FU—J. K. Fullagar (Dr.), Now VK3AFU.
 4LJ—J. R. Lewis, Now VK3LJ.
 4RG—G. E. Ryan.
 4TC—A. Tremayne.
 5ZAC—B. M. Byrne.
 5IB—I. G. Gillies, Now VK3IB.
 5SK—D. S. Mackay.
 5AQ—J. Ayling.
 6CD—D. F. Dawson, Now VK3CD.
 6SN—A. W. Sowden.
 6SP—W. J. Sperring.
 * See New Call Signs.

BOOK REVIEW

RADIO AMATEUR'S HANDBOOK

The 1955 edition of the *Radio Amateur's Handbook* has recently been released. The American Radio Relay League is proud to announce publication of this thirty-second edition of a book that is internationally recognised, universally consulted and truly the all-purpose volume of radio. Published continuously since 1926, the *Handbook* has become a leading reference work for hundreds of thousands of radio amateurs, experimenters, students and engineers.

The new *Handbook* features five basic chapters of basic radio theory, three chapters concerned with history and Amateur Radio operating practices, three of basic experimental data, and fifteen chapters of advanced theory together with practical constructional details, including transmitters, receivers, transmission lines, antennae, power supplies, single-sideband, frequency modulation, keying, amplitude modulation and microwave techniques.

Among the principal revisions of the new edition are those in the vacuum tube tables and base diagrams. Two full pages listing 67 new tube types have been added to the miniature-tube section alone. Further additions include 26 crystal diodes, 19 rectifiers, 17 transistors, and 32 other types. A complete listing of electrostatic cathode-ray tubes also forms a part of the tube tables.

The chapters concerned with very high frequencies have been extensively changed to improve clarity and to take advantage of techniques developed as a result of greater occupancy of this por-

tion of the radio spectrum. Notable in this respect especially is the chapter dealing with v.h.f. transmitters, which includes equipment using tubes developed in the past year.

The high frequency transmitter chapter also has been widely revised. Many new units are included, incorporating such features as continuous (multiband) tuning circuits and clamp-tube protective circuits.

The *Handbook* is revised and restyled in the light of current needs as a radio construction manual, reference work and training text for class or home study. 768 pages, 5 1/2" x 9 1/2", including catalogue section and 11-page index. Over 1,300 illustrations (including 95 charts and tables, and 559 tube-base diagrams), and 85 basic formulae. Price in Australia is 44/3.



VISIT

STAND 74B

Engineering and Industrial Exhibition

JULY 4-9

SEE ELECTRONICS AT WORK

GLORAD ENGINEERING SERVICES

291a TOORONGA RD., S.E.6 MALVERN, VICTORIA

Phone: BY 3774

DOES YOUR WILLIAMSON ANNOY YOUR DOG?

IS YOUR CLASS B AMPLIFIER LINEAR?
ARE YOUR 'SCOPE AMPLIFIERS FLAT?
DOES YOUR VENTED ENCLOSURE BOOM?
EVEN YOUR BEST FRIENDS WON'T TELL YOU.
PLAY IT SAFE. GET THE FACTS ON YOUR SET-UP.

BUY AN ELECTRONIC PRODUCTS AUDIO OSCILLATOR KITSET!



20 CYCLES—20 Kc.
SINE WAVE
10 V. OUTPUT
1% DISTORTION

SQUARE WAVE
40 V. OUTPUT
2 MICROSEC. RISE

600 OHM OUTPUT

HI-STABILITY
RESISTORS

CALIBRATED
OUTPUT

AT £19/19/-. PLUS A FEW SHILLINGS POSTAGE, IT'S A STEAL!

Not only will you have a worthwhile instrument—you'll have a whale of a lot of fun building it—and you can then thumb your nose at the critics.

To those die-hards who say "Who is this crowd; is their gear any good?" we say this:—

We're new to the manufacturing field, BUT we've studied your requirements. We're out to supply them direct to you at a price you can afford. Our customers will get plenty of good old-fashioned service—they help us to grow—we believe they are entitled to it. Our technical specifications are backed by a Money-Back Guarantee. We can do this with confidence. Our performance claims have been checked independently and found 100% reliable. Send orders or enquiries to:—

ELECTRONIC PRODUCTS

P.O. BOX 28, PUNCHBOWL, N.S.W.

REMEMBRANCE DAY CONTEST, 1955

The Remembrance Day Contest is an Australian annual contest to perpetuate the memory of those Australian Amateurs who gave their lives for their country during World War II. It is held on the week-end nearest to the 15th August in each year, the date on which the hostilities ceased in the S.W.P.A.

A Handsome Perpetual Trophy is awarded annually for competition between States, inscribed with the names of those who made the supreme sacrifice, and so perpetuating their memory throughout Amateur Radio in Australia. The name of the winning State each year is also inscribed on the Trophy.

Again this year Amateurs in the VK1 call areas can participate in the Contest. Scoring for contacts with VK1 remain the same, namely, six points per contact per band for all States for contacts with VK1.

RULES

1. The Contest will commence at 1800 hours E.A.S.T. on 13th August and continue through until 1759 hours on 14th August.

2. The Contest is open to all Australian Amateurs, but only members of the W.I.A. are eligible for the awards.

3. The Contest is an open event—c.w., phone, or a combination of both may be used.

4. The Contest is an Interstate Contest, and Amateurs in each State endeavour to contact Amateurs in all other States.

5. A station may be operated by more than one operator under the station call sign provided that operators, other than the station licensee, submit a separate log under his own call sign for contest purposes.

To implement this rule, the following procedure shall be adopted by all licensees other than owners of the station concerned.

(a) Licensees operating stations other than their own shall, for the purpose of these rules, be hereinafter referred to as "substitute operators."

(b) Phone Contacts: Substitute operators will call "CQ Remembrance Day," followed by the call sign of the station they are operating, and the word "log" followed by their own call sign.

(c) C.W. Stations: Substitute operators will call "CQ R.D. de" followed by a group call sign comprising the call sign of the station they are operating, an oblique stroke, and their own call sign.

(d) Receiving Contestants. Contestants receiving signals from substitute operators will qualify for points by recording the call sign of the substitute operator only (i.e. the last call sign).

(e) Nothing in (a), (b), or (c) above will preclude the station licensee from participating in the contest himself, providing he submits a separate log under his own call sign.

6. All existing Amateur bands may be used, and all transmissions must conform with the Regulations as laid down in the P.M.G.'s "Handbook for

the Guidance of Operators of Amateur Wireless Stations." Any breaches of these will lead to the disqualification of the operator concerned.

7. The arrangements of schedules for contacts on other bands will not be permitted.

8. All stations entering the Contest will call "CQ RD" if using c.w., and "CQ Remembrance Day" if using phone, subject to rules governing substitute operators under rule 5 (a), (b), and (c) above.

9. A State competing for the Trophy must submit a minimum of six (6) logs from financial members before becoming eligible for contesting the Trophy.

10. Only one contact per station per band is permitted.

11. Serial numbers to be exchanged during the Contest will be as follows:—

(a) For C.W. the first three figures will be the RST (telegraphy) report, followed by the serial number of the contact commencing with any number between 001 and 100 for the first contact and increasing in value by one (1) for each successive contact. If any contestant reaches 999 he will then commence 001 and continue 002, 003, 004, etc.

(b) For Phone the first two figures will be the RS (telephony) report, followed by the serial number of the contact commencing with any number between 001 and 100 for the first contact and increasing in value by one (1) for each successive contact. If any contestant reaches 999, he will then commence 001 and continue 002, 003, 004, etc.

A complete exchange of serial numbers must take place before any points may be claimed for the contact.

12. In order that an equitable distribution of points for States with a large number of contestants compared with a State with fewer contestants may be determined, a sliding scale of points has been allotted as shown in the scoring table appended.

13. In addition to the points in the scoring table that may be scored by a contestant, a bonus of 25 points may be added to the total score for each State worked on 50 Mc. or above.

14. The log submitted must show in the following order: Date, time, band, emission, call sign, RST/No. sent, RST/No. received, points claimed. No log will be accepted unless laid out in this order.

15. A statement signed by the operator must be attached at the conclusion of the log stating that the Regulations (Rule 6) and these Rules have been observed. Any logs departing from this form will automatically be disqualified.

16. All logs must be forwarded through the Contestant's Divisional Council (for membership checking) to reach the Federal Contest Committee, Box 1234K, G.P.O., Adelaide, on or before 10th September, 1955.

17. Attractive certificates will be awarded to the first, second and third highest in each State; there will be no

outright winner for Australia. Where a large number of logs are received from any one State, further certificates may be awarded at the discretion of the Contest Committee.

18. The State to which the Perpetual Trophy will be awarded shall be determined as follows:—

To the average of the top six (6) logs shall be added a bonus arrived at by multiplying this average by the ratio of valid logs submitted by that State to the total of Amateur Licensees in the Division at the time of the Contest.

Example: Total points equals—

Aver. Score { 1 plus $\frac{\text{No. of Logs}}{\text{No. of Licensees in Division}}$ }

19. The logs which will be accepted for the multiplier under Rule 18 shall show at least five (5) contacts in the Contest.

20. The Trophy shall be forwarded to the winning State in its container and will be held by that State for a period of twelve (12) months when the winners for the succeeding year is determined.

21. The Federal Contest Committee shall be the sole adjudicators and their ruling will be binding in the case of any dispute.

SCORING TABLE

		To								
		VK1	VK2	VK3	VK4	VK5	VK6	VK7	VK9	
From	VK1	..	6	6	6	6	6	6	6	
	VK2	..	6	1	2	3	5	4	6	
	VK3	..	6	1	1	3	2	5	4	6
	VK4	..	6	1	2	1	3	6	5	4
	VK5	..	6	2	1	3	1	5	4	6
	VK6	..	6	1	2	4	3	1	5	6
	VK7	..	6	2	1	4	3	5	1	6
	VK9	..	6	1	2	3	4	5	6	1

Note.—Read the table from left to right for points for the various States.

Examples:—

VK2 scores 1 point for a VK3 contact
 2 " " " VK4 " "
 3 " " " VK5 " "
 VK6 scores 1 " " " VK2 " "
 2 " " " VK3 " "
 4 " " " VK4 " "

AUSTRALIAN V.H.F. RECORDS

TWO-WAY WORK				
Band Mc.	Stations	Date	Miles	World Rec'd
50	VKSK1-VTACH/KH6	26/4/51	8355	10909
144	VK3GM-(2-VK12L/FF	9/3/58	317	1400
288	VK3AFJ-VK3AAF/5	21/3/54	83.8	—
576	VK3ANW-VK3AKE	11/12/49	81.6	—
1215				100
2200	VK3ANW-VK3KA	18/4/50	8.3	150
5890				100
10000				100
21600				800 ft.
30000				—

It is in the interests of all v.h.f. enthusiasts to supply F.E. through Divisions if you can better these figures. Please give EXACT details of all locations when submitting your records.

ROSS A. HULL MEMORIAL V.H.F. CONTEST 1954-55 RESULTS

WINNER OF TROPHY VKANG

R. Greenwood, Rockhampton.

AUSTRALIA

New South Wales Points	South Australia Points
VK2ABC 1397	VK5MK 1620
2HE 795	5QR 1205
2ATS 616	SAX 307
2ZX 413	5ZL 264
Victoria	West. Australia
VK3ZL 1484	No Entries
3XK 785	
3YS 728	Tasmania
3KC 464	VK1ZL 820
Queensland	7BQ 108
VK4NG 3490	
4WD 1650	
4GG 1242	
4MT 130	

Check log from VK6BO.

OVERSEAS

Points	Points
ZL1BJ 1554	VR2CG/
2AGD 952	ZL3LR 984
2DS 874	
2ADO 710	
3RZ 674	

First contact to VK6—VR2CG—VK6HK.

COMMENTS ON V.H.F. CONTEST

Perusal of the call signs in the top logs in each State showed that approximately 50 stations in VK2, 30 in VK3, 15 in VK4, 15 in VK5 and 15 in VK6, VK7, and VK9 were active. An outstanding feature of the Contest was the participation of nearly 50 stations from all districts in New Zealand. VR2CG/ZL3LR is to be congratulated on his fine score and his success in the first VR2/VK6 contact. VK4NG certainly showed great perseverance.

It is a pity that many stations that participated did not submit logs. This meant that no complete checking could be undertaken by the committee. Fortunately the winning entry was so far ahead that the committee was able to feel satisfied with the checking that could be done.

The committee wish to thank those who took the trouble to send comments and suggestions. The rules, as they were framed by the committee and placed before the Divisions for ratification, were to implement the decisions made at the 1952 Convention. There it was agreed unanimously that all v.h.f. bands were to be included in this Contest. Thus it was felt that it would be futile to make it only an Interstate Contest and in order to introduce the idea slowly, rules for intra-State contacts and a longer operating time were introduced.

The folly of not allowing the Contest Committee to have the final say in drafting rules for these contests was well shown here when some Divisions vetoed the intra-State working and left its companion rule standing. Since there was insufficient time for any further correspondence on the matter, the rules,

a little "pied-piper-ish" to say the least, had to be published as they stood.

Comments received suggest that scoring be 5 points for the first contact with a maximum of 5 contacts; that the time be shortened; that there be a multiplier for low power mobile operation, etc. Decisions on the 1955-56 Contest, which will be the last using the 50-54 Mc. band, must be finalised this month and the committee will give many hours of serious consideration to them.

I would urge you all to respect their combined judgments, for theirs is a deeper insight to the problems involved as they are in closer touch with Federal Executive and its directive, Federal Council. The committee functioning as a unit can carry out the policy as laid down by the Divisions at the Convention to the betterment of the Institute as a whole.

The Ross Hull Memorial Contest is a fine Contest inspired by a great ideal, to perpetuate the memory of a man whose vision was self-less and inspired. Have faith in your committee for they are motivated by that same vision.

G. M. Bowen, VK3VU, Chairman,
Federal Contest Committee.

NATIONAL FIELD DAY

Logs have been received from the following: VK2WJ; VK3 ADW, 3AHH, 3APB, 3ARJ, 3GE, 3RN, 3SX, 3YS, 3IE, 3ZAM; VK5PS and one listener's log from N. G. Clarke.

AMATEUR BANDS AVAILABLE

1.84—1.86 Mc.	1288—296 Mc.
3.5—3.8 "	1576—585 "
7—7.15 "	1.215—1.300 "
14—14.35 "	2.300—2.450 "
21—21.45 "	5.650—5.850 "
26.96—27.23 "	10.000—10.500 "
28—30 "	121.000—22.000 "
50—54 "	130.000 Mc. and
144—148 "	Above.

* Available for emergency network purposes only. Normal Amateur activities are not permitted in this band.
† Temporary allocations.

50 Mc. W.A.S.

Call	Certificate Number	Additional Countries
VK3WJ	13	4
VK3PG	5	3
VK3VW	9	3
VK3RY	2	2
VK4HR	4	2
VK5LC	1	1
VK3DW	2	1
VK3RR	6	1
VK3ST	7	1
VK3AZZ	10	1
VK3XA	11	1
VK3GM	12	1
VK3ACL	14	1
VK3JD	16	1
VK3RO	17	1
VK3ABC	8	—
VK3WH	15	—

PHASE SHIFT NETWORKS

(Continued from Page 3)

band suppression figure at any frequency if the differential phase shift is known.

Suppose the worst deviation is 2% from 90°, then—

$$\text{undesired sideband} = \tan\left(\frac{2^\circ}{2}\right) \text{ desired sideband}$$

$$= 0.0174 \text{ and } 1 \div 0.0174 = 57 \text{ (approx.)}$$

This ratio is equal to 35 db., as this is the figure for the point of greatest deviation, the sideband suppression of the unit over the greater part of its range would be in excess of 40 db. (a voltage ratio of 100:1). A departure from 90° of 6° is required before the amplitude of the undesired sideband becomes 5% that of the desired one, a rejection of 26 db. This figure is similar to that obtained with some of the simplest crystal exciters, using two or three crystals, where one crystal is used to eliminate the whole of the undesired sideband. This figure of 26 db. would be about the worst one would want to use, as after all one S point = 6 db. and 26 db. of rejection is not a very good performance figure.

The fetich of accuracy of components, the writer thinks, has been a little overdone. It is all right in commercial practice, but in Amateur circles, where extensive test equipment is not available, the performance of the complete s.s.b. transmitter or receiver little will be gained by trying to achieve a ratio of more than 100:1 of suppression of the unwanted sideband (40 db.). The reason for this outlook is that nonlinearity of almost any type in the subsequent circuits (either r.f. or a.f.) following the phase shift unit, and differences in phase shift and distortion in the two individual audio channels, all tend to degrade the sideband suppression of the transmitter or receiving adaptor, and thus "put back" a certain amount of the suppressed sideband.

Fortunately, distortion (non-linearity) in cascaded circuits adds up algebraically not arithmetically. For example, if we have a signal with a distortion content of 1% and we feed it into equipment which has a distortion figure of 2%, the resulting distortion in the output signal is given by—

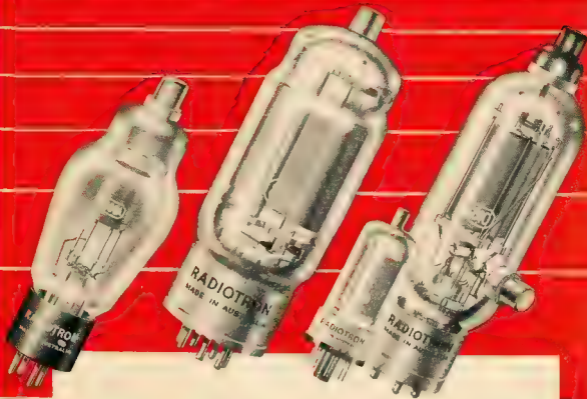
$$\text{distortion in output} = \sqrt{1^2 + 2^2}$$

$$= \sqrt{5} = 2.24\%.$$

The reason therefore of running all s.s.b. equipment at a power level where distortion is low will be apparent. It will well repay anyone building up a phase shift unit to spend a little time working out the formula for the lattice type networks for various values of R1, differing in steps of 1,000 ohms, and see how the component values change. Also in connection with the above, work out some examples of compensation for one component in a pair by varying the other, using the R/C figure method described, you will worry a good deal less about these units afterwards.

This article has been somewhat lengthy because the maths involved have been kept simple and a lot of it "written around," but it is hoped that audio phase shift networks will not be as big a mystery to readers as previously.

RADIOTRON POWER VALVES



Today's high standards of radio performance are dependant upon the use of first quality components.

Radiotron valves are manufactured to exacting standards which ensure you of the ultimate in performance at all times.

Be sure of the quality and consistency of your signals by using Radiotron Power Valves.

Important: When ordering valves, be sure to mention "Amateur Radio" so that priority can be given to your order.



RADIOTRON

AMALGAMATED WIRELESS VALVE CO. PTY. LTD.

"HAM" RADIO SUPPLIERS

(KEN MILLBOURN, PROP.)

ANNOUNCE THEIR STOCKTAKING SALE

Bargains Galore - - Compare These Reduced Prices

NOTE THESE VALVE PRICES LARGE STOCK OF CRYSTALS

Look at these Bargain Priced NEW VALVES—

1A5	2/6	6N8	15/-	12SJ7	10/-	VE21	2/6
1B5	2/6	6RTG	5/-	12SK7	10/-	VR22	2/6
1K4	5/-	6RTG	10/-	12SQ7	2/6	VR32	2/6
3Q5	5/-	6SA7	10/-	12SQ7GT	2/6	VR35	2/6
5V4	10/-	6SC7	10/-	816	15/-	VR38	2/6
6AG7	15/-	6SJ7GT	12/6	888	£1	VR66	2/6
6B8	15/-	6SK7GT	12/6	894	£1	VR75	15/-
6C8	7/6	6BS7	12/6	884	£1	VR99	5/-
6C8	7/6	6U7G	10/-	954	10/-	VR102	5/-
6F8	7/6	7A4	5/-	955	10/-	VR103	5/-
6F6	10/-	7A6	5/-	987	10/-	VR105	15/-
6K6	7/6	7A8	5/-	1025	£1	VR122	2/6
6K7	10/-	7B8	5/-	0763	25/-	VR150	15/-
6K7	7/6	7C7	2/6	EF50	10/-	VT50	2/6
6L7	10/-	7E8	5/-	U10	2/6	VT51	2/6
6L7G	7/6	7E8	5/-	VR18	2/6	VT52	10/-
6N7	10/-	7W7	5/-	VR19	2/6		

Full stocks of New Valves available. Prices on request.

Following list are ex Disposals, guaranteed—

1K5	5/-	5U4	12/6	6J5GT	10/-	6V8	10/-
1K7	5/-	6AC7	10/-	6SA7	10/-	12A6	10/-
1L4	5/-	6AG5	10/-	6SJ7	10/-	12K8	10/-
1B5	10/-	6C6	5/-	6SK7	10/-	1025	15/-
2X2	10/-	6D6	5/-	6SL7	15/-	CV92	15/-
3A4	5/-	6H6	5/-	6SN7	7/6	EF50	5/-

C.R.O. Power Supplies, 220-260 AC Input, variable HT output: 750v., 1300v., 1900v.; LT output 320v. at 100 Ma. Two 2.5v., one 5v., one 6.3v. filament winding. One 2X2, one 5V4. Complete in metal case 23 x 8 x 14. Few only, £12/10/- F.O.R.

Bendix RA1B Power Supplies, 240 volt AC, 24v. at 1 amp. output 250v. HT

Genemotor Power Supply, SCR522, 24v. input, 150v. and 300v. output at 300 Ma. Includes relay, voltage regulator, etc. A gift at £1. Too heavy for postage.

2.5v. or 4v. Filament Transformers

Chokes, 15 Henry, 100 Ma.

Chokes, 15 Henry 175 Ma.

Soler 28 pF. silver plated wide-spaced Condensers

2 uF 1000v. block type Chanex Condensers

Relays, A.W.A. Aerial Change-over type, 12v.

English Carbon Mike Transformers, new

Locktal Sockets

Valve Sockets, ceramic, 8-pin Octal

100 Kc. R.C.A. Crystals

1000 Kc. Crystals, DC11 holder, with two pig-tail connect., 35/-

Marker and Commercial Crystals, price on request. Delivery seven days.

Following is a list of Crystal Frequencies available for immediate delivery. £2 each—

1500 Kc.	5300 Kc.	7020 Kc.	7110 Kc.	8042 Kc.
1900 Kc.	5335 Kc.	7021 Kc.	7120 Kc.	8155 714 Kc.
2081.2 Kc.	5360 Kc.	7024 Kc.	7121 Kc.	8161.538 Kc.
2103.1 Kc.	5456 Kc.	7025 Kc.	7125 Kc.	8171.25 Kc.
2112.5 Kc.	5530 Kc.	7032.6 Kc.	7126 Kc.	8176.923 Kc.
2208.1 Kc.	5700 Kc.	7035 Kc.	7130 Kc.	8182.5 Kc.
2218.7 Kc.	5815 Kc.	7042.65 Kc.	7134 Kc.	8183.5 Kc.
2625 Kc.	5892.5 Kc.	7047 Kc.	7135 Kc.	8188.889 Kc.
3062.5 Kc.	6100 Kc.	7050 Kc.	7150 Kc.	8317.3 Kc.
3065.5 Kc.	6350 Kc.	7052 Kc.	7156 Kc.	8320 Kc.
3382.5 Kc.	6375 Kc.	7053.5 Kc.	7163 Kc.	8069 Kc.
3500 Kc.	6450 Kc.	7064 Kc.	7174 Kc.	8125 Kc.
3511 Kc.	6666.7 Kc.	7068 Kc.	7175 Kc.	10 Mc.
3511.2 Kc.	7005 Kc.	7072 Kc.	7175 Kc.	10.511 Mc.
3516 Kc.	7010 Kc.	7073.5 Kc.	7180 Kc.	10.515 Mc.
3527 Kc.	7010.7 Kc.	7075 Kc.	8007.69 Kc.	10.524 Mc.
3540 Kc.	7011.5 Kc.	7077 Kc.	8008.5 Kc.	10.530 Mc.
3825 Kc.	7011.75 Kc.	7079 Kc.	8009 Kc.	10.5485 Mc.
4010 Kc.	7012 Kc.	7088 Kc.	8009.3 Kc.	10.556 Mc.
4070 Kc.	7013.75 Kc.	7100 Kc.	8010.5 Kc.	10.620 Mc.
5050 Kc.	7016 Kc.	7106.7 Kc.	8013 Kc.	14.322 Mc.

MORE BARGAINS ON INSIDE FRONT COVER!

Simulator Sets. Contains two meters 0-20v. and 0-5 Ma., 2 in. square type. Two VR65, one VR135 valves, one vernier dial, Genemotor 11-12v. input, output 480v. at 40 Ma. (conservative rating) and lots of resistors, condensers, etc. £5 each

American Metering Kit containing one 0-10 Ma. and one 2 Ma. Meter. 2 inch round. Complete with cords and plugs. £2

Inter-Com. Units, English. Contains two valves, transformers, P.M.G. key switch, resistors, etc. To clear

Shielded Cable with two 12-pin Plugs

Five-core Cable, not shielded

Co-ax Connectors, Ampenol type, male and female

Co-ax Connectors, male/female, small Pi type, new, 2/6 pair

Co-ax, indoor type, cotton covered

Co-ax Cable, any length, 50 ohms

5A MELVILLE STREET, HAWTHORN, VICTORIA

North Balwyn Tram Passes Corner, near Vogue Theatre.

Phone: WA 6465

Money Orders and Postal Notes payable North Hawthorn P.O. Packing Charge on all goods over 10 lbs. in weight, 5/- extra.

WANTED TO BUY—RADIO PARTS, VALVES, TRANSFORMERS, RECEIVERS, TRANSMITTERS, ETC.

62AX have returned from National Service. Lionel is re-building his modulator and Don busy shifting to his new QTH in Guildford. Len 62AT has been heard 6-8 in Fremantle by 62AA and another contact should be made here before long.

Tim 62U and Dave 6WT made a re-appearance on the band and emit nice signals with their converted 1143c. They caused a minor "dodge" of boys wanting new contacts! 62AA has built up a diode i.m. exciter and is busy on the discriminator as per 3ANF's articles in "A.R." Roger 6RK is re-building his f.m. and Don 6AN is trying a phase modulator. Warren 6WT is prepared to grind anyone's crystal down. Warren shifted down from 144.48 to 144.19 Mc. My word this baby power stuff must be dynamite! Don 6HK has double converted a Command rx for use in his proposed 3 mx mobile station.

Don 6HK and Wally 62AA have an interesting excursion to the Mornington trip point. Conditions were poor and the only two-way contact was with 6BO with signals 49 both ways. 62AB/P was the only other station heard. Afterwards a large piece of ironstone was found attached to the permag speaker so perhaps this, plus the antenna being surrounded by trees were responsible for the poor signals. However, it was a most informative trip and showed that even 80 mx is not reliable 100 per cent, as signals on that band were little better than on 8 mx.

288 Mc.: 62AV and 6BO have been carrying on their tests. Frank 6CC was heard by Don 62AV over a distance of eight miles. The contact was multiband 146, 288 and 3.9 Mc. You'll have to build a 3 mx converter Frank! Stan 62AS is wiring up his mod. sec. and should be on the band very soon. Murray 62AM and Wally 62AA have a crossband QSO from Kalamunda with Rolfe 6BO. Wally's new xtal converter, 616 mixer, was used and also a modified AR501. Tests from Bassendean to Fremantle over a difficult 15-mile path were unsuccessful. Looks like an r.f. stage is needed Wally! 62AV is trying out a double mixer in an AR24 rx. Injecting 136 Mc. into both mixers. Tuning from 136 to 140 Mc. he covers the eight megacycles of the 88 Mc. band and the lower frequency oscillator is more stable! Should work very well Don. Cecil 62AZ is talking about putting on a pair of 7183s.

676 Mc. and Above: NIL at the moment. How about it boys?—6HK.

S.W.L. SECTION*

S.W.L.'s. TO BE ISSUED WITH OFFICIAL CALL SIGNS

From the 1st June, 1955, Associate members of the Victorian Division W.I.A. and members of the S.W.L. Group will be issued with official L numbers. This means that s.w.l.s. can have printed on their cards and report forms official station numbers.

If you are a member of the Victorian Division and wish to obtain an official s.w.l. L number, write to the Secretary, W.I.A. Victorian Division, 191 Queen Street, Melbourne.

Official report forms may be obtained from the above address at a cost of 2/6 per 50 sheets.

EST. CONTEST

Well last month saw the end of the first official S.W.L. Contest and by the time this issue goes to press, the judges will be examining all entrants' cards.

Results will be published in next month's "Amateur Radio," and broadcast through SWI on 7146 Kc and 3573 Kc. at 1130 hours E.S.T. on Sunday, 31st July, 1955. So chance, do not forget, have these receivers tuned to those frequencies on that morning. Winners will be notified by mail.

VICTORIAN S.W.L. GROUP

This Group met in the Club Rooms, 191 Queen Street, on Tuesday, 31st May, at 2015 hours. We had a large number present and had a very good rag-chew on coming attractions of the year. Meeting closed at 2350 hours E.S.T.

SOUTH AUSTRALIAN S.W.L. GROUP

At the time of writing, no notes had been received from this Group for the month of May. I was informed that VK3 Jim Paris was visiting VK3 early in June and then going on to VK1. Jim is on holidays, so good luck Jim and have a good time.

* Compiled by John Wilson, 37 Raymont Street, Alphenington, Vic.

S.W.L. KINKS AND KINKS

To keep this column going, we wish to hear from any s.w.l. who has any ideas to exchange in this column. Just send all ideas to "Kinks and Kinks S.W.L. Section," 37 Raymont Street, Alphenington, N30, Vic.

AROUND THE BANDS

Over the past month the bands have been very active, both week-ends and evening. 30 mx has proved very crowded with both Europeans and Ws, while 40 mx during evenings up to 1700-200 has shown W-9 at S-F signals.

Those heard have been—14 Mc.: From Michael Ide: 3FO, 3YS, 3EN, 3BH, 3BQ, 3RK, 3ZAM, 3ZAH, 3ZAA. He has received QSLs from 3FO, 3BH, 3YS, 3ZAY, and 3ZAM.
21 Mc.: From Rod de Balfour, of VK7-ZLSEK and WOKOK at 53-4 plus VK3 and VK4 and weak Ws.

14 Mc.: Michael Ide—CO1, CO2, CMB CT1, D12, D14, DD6, HP3, FAS, 112, JAS, KAS, 3, 7, K15, K34, K58, K29, K54, K17, K56, KWS, KX1, TG9, T12, V32, VE7, V12, VR2, 3, VY1, YV5, XE1, XE2, ZMS, VK9, V81, V85, 4X4, CT2, JAI, YX1 and all W call signs from Albert Angus—K3, 4, 6, 8, ZL1CA, CO4BC.

Gordon Hepburn, of VK3, heard 150 stations on 30 mx during the last month. Receiver is a Kretzler d.w. table model on inside antenna. Good work, Gordon, and from my location—W1-0, KA, KG, KL7, 4X4, 457, HP3, K4, ZLI-3, 7 Mc. My location—VK3-6, W8-2.

Thanks to Michael Ide, Gordon Hepburn, Rod de Balfour, and Albert Angus for your reports.

Broadcast Band DX. Heard on approx. 1420 Kc. Station KHON (or M) at 83. R3 This station was heard at 0300 E.S.T. and should be a good one during the Winter months. They put on a news service at 0300 till 0505, then hit tunes until 0530 E.S.T.

Also on 930 Kc. Voice of America in the Philippines at 89 signal. Real arm-chair copy.

Broadcast Short Wave: AFRS on 31 mx band 80 signal with baseball round-ups at 2100 E.S.T. Radio Australia at 0200 E.S.T. to Asia on Saturday on 40 mx band, excellent signal. Canada to Eastern Australia daily on CKLO 5.65 Mc. (31.15 mx) and CKUA 5.97 Mc. (30.35 mx) at 87-9 signal. Listeners' Corner is heard on the Saturday transmission. Air times 1945-1915 E.S.T. daily.

PLATED CRYSTALS

offered by

BRIGHT STAR RADIO

46 EASTGATE ST., OAKLEIGH, S.E.12 UM 3387

LATEST MODERN EQUIPMENT

AMATEURS! BRIGHT STAR PLATED CRYSTALS WILL GIVE YOU GREATER ACTIVITY.

PRICES FROM £5/12/6.

COMMERCIAL PRICES ON APPLICATION.

BRIGHT STAR CRYSTALS may be obtained from the following Interstate firms: Messrs. A. E. Harrold, 123 Charlotte St., Brisbane; Gerard & Goodman Ltd., 182-196 Rundle St., Adelaide; A. G. Healing Ltd., 151 Pirie St., Adelaide; Atkins (W.A.) Ltd., 894 Hay St., Perth; Lawrence & Hanson Electrical Pty. Ltd., 120 Collins St., Hobart; Collins Radio, 409 Lonsdale St., Melbourne; Prices Radio, 5-6 Angel Place, Sydney.





FEDERAL

THE QUEEN HONOURS AMATEUR

A Birthday Honour has been conferred by Her Majesty the Queen on a well known member of the Wireless Institute. The popular President of VK2, Mr Jim Corbin, VK2YC, has received the M.B.E. Award in recognition of his outstanding assistance in Amateur Radio, particularly in the recent New South Wales floods.

Members throughout Australia will join with Federal Executive in offering congratulations. Well done Jim, and thanks for your fine work. The honour reflects credit on the Institute.

TELEVISION

Of all the particular aspects of the Television set-up in Australia, probably that of most interest to Amateurs is the matter of frequency channels. These are—

49 — 55 Mc.	174 — 181 Mc.
63 — 70 Mc.	181 — 188 Mc.
85 — 92 Mc.	188 — 195 Mc.
132 — 138 Mc.	195 — 202 Mc.
139 — 145 Mc.	202 — 218 Mc.

It will be noted that the 49-55 Mc. V. band results from the change of the Amateur 50-54 Mc. band being changed to 50-60 Mc. This change will take place in 1956. The 138-145 Mc. band involves the change of the 144-148 Mc. band to 148-150 Mc. This change, however, is not proposed until 1962.

Amateurs who were on the air pre-war will remember that 50-60 Mc. was one of the authorized bands and was the centre of much experimentation before 1939.

A SILVER ANNIVERSARY

An interesting Silver Anniversary which took place last May was that of "The Calendar," the official news sheet of the I.A.R.U. (International Amateur Radio Union).

The first Calendar was dated May, 1929, and it has been published regularly, except for war years, ever since in June and December. This Calendar was established by the Constitution of 1929, which changed the I.A.R.U. from a

mixture of individual members, national sections, and member societies to its present form, and its first act was to proclaim the adoption of the then new constitution. Present members on the roster at that time included A.R.R.I., A.R.I., Canadian Section A.R.R.I., R.S.G.B., R.E.F., S.A.R.L. and W.I.A.

FED. CONTEST COMMITTEE

On another page of this issue will be found the complete rules for the 1955 Remembrance Day Contest. These rules are substantially the same as for the 1954 Contest, except that the operating procedure of what we have termed "substitute operators" has been clarified and incorporated in the body of the rules.

Members will remember that last year the Committee was asked at short notice to clarify rule 5 (which, incidentally, has been in the rules for some years) and their interpretation which was acceptable to W.I.A. members last year and also the Radio Branch of the P.M.G. Department has now been embodied as a subdivision of rule 5.

Your Committee is disappointed they have been obliged to publish the same rules as last year, because it was hoped some formula could be devised to ensure an equitable distribution of points which would fairly reflect the Divisional effort of both large and small States alike. This has not been due to lack of effort on the part of your Committee and others concerned in the popularity of this Contest.

Most comprehensive proposals were made by your Committee, Major Mitchell, of Federal Executive, and Bill Falconer, our Secretary. The Committee also received most constructive suggestions from the VK7 Division.

It appears, however, that no two States could agree on any formula proposed by the various members concerned and as a result, the rules must remain the same, at least for this year.

The Committee wishes you all the best of luck in the Contest. We would like to see as many participants as possible enter the Contest this year in the interest of their Division

to whom they owe their support. May the best Division win.

The Committee proposes to publish in the form of an article in the August issue of this magazine some suggestions on operating procedure, together with some "Do's and Don'ts" which will assist the Committee in checking logs. Please do your best to follow these suggestions because we can assure you they will help the checking Committee very much, especially at 0100 in the morning during peak periods when their grid drive is very low!

FEDERAL QSL BUREAU

EAY JONES, VK3RJ, MANAGER

A QSO with YJ1DL brought to light some interesting information on an affair in general in the New Hebrides. He reveals that prior to taking up duty there he was ZC3AB on Christmas Island for some time. Prior to returning to YJ he had a spell in VK4 but decided he liked the islands better. Informed me that an old time friend in Frank Harvey, YH1KY, had passed away about two years back. Frank, who was at Kpl. Bonkovic, would be well known to the real old timers. YJ1DL states that there are three French Amateurs there although FUAAC is presently on furlough in France. They seldom work non French-speaking Amateurs owing to their knowledge of English being very limited. YJ1DL was currently using 220 watts, but his normal input is 80 watts. The higher power is too costly to the power charges being two shillings per kw hour. Says life will be a little dull from June onwards as the plane service is then due to cease. He is still a financial member of the N.S.W. Division and states that sometimes he receives "Amateur Radio."

Jim Penhouse, VS9DQ, of Baling Estate, Kuala Kelil, Kuala Malud, says he plans to paper to say he will be going on leave to England in July next and returning to Malaya in 1956. He is disappointed at the ready response to QSLs, which has him held up on DX C.C., E.R.T.A. and W.A.P. As QSL Manager for the M.A.R.T.A. he states that for many months

AN OPEN LETTER

Logically, the outstanding performance of TRIMAX PRODUCTS implies that they are not always the cheapest available, but there is that assurance of long-life and efficient service which is synonymous with Trimax Quality.

In the long run, TRIMAX gives you the best value for your money . . . maintenance costs are cut . . . and performance is trouble-free and continuously efficient.

Let TRIMAX solve your transformer problems.



TRIMAX

FOR TRANSFORMERS OF QUALITY

* OUR NEW CATALOGUE IS NOW AVAILABLE.

Write for your copy immediately!

CNR, WILLIAMS ROAD & CHARLES STREET, NORTH COBURG, VIC.

FL 1101

Trimax is a division of CNE & Bunting Pty. Ltd.

These Distributors have TRIMAX

VIC.
J. H. Magrath & Co. Pty. Ltd.
Heslings Ltd.
Radio Paris Pty. Ltd.
Homercraft Pty. Ltd.

N.S.W.
John Martin Pty. Ltd.
University Gram
University Graham
Instruments Pty. Ltd.

S.A.
A. G. Hesling Ltd.
Newton McLaren Ltd.
Radio & Electrical Wholesale
sellers Pty. Ltd.
Gerard & Goodman Pty. Ltd.

W.A.
Nicholson's Ltd.
Akins (W.A.) Ltd.
Carlyle & Co. Ltd.

Q.L.D.
Chandlers Pty. Ltd.

TAS.
W. G. Genders Pty. Ltd.

"ACOS" CRYSTAL MICROPHONES and MICROPHONE INSERTS

A Complete Range For Every Purpose

DESK OR HAND MICROPHONE

MIC 36



£6/18/6

Housed in attractive plastic case, this Microphone is ideal for home recording and public address, etc. Response unexcelled for its size and price. The performance is not affected by vibration, shock or low frequency wind noise. Omni-directional frequency response substantially flat from 30 to 7000 c.p.s. Recommended load resistance not less than 1 megohm dependent on low frequency response. Can be supplied complete with switch and floor stand adaptor as required at a small extra cost.

HIGH QUALITY MICROPHONE

Designed to meet even the most exacting requirements, this Microphone incorporates the world famous floating crystal sound cell construction. Its special characteristics are that its fine performance is not affected by vibration or shock. The fidelity is not impaired by low frequency wind noise.

SPECIFICATION

Recommended load resistance—not less than 1 megohm.
Output level —55 db ref. 1 volt/dyne/cm².
Frequency response—substantially flat from 30 c.p.s. to 10,000 c.p.s.
Directivity—non-directional.
Size—2½" spherical diameter.
Connector—Standard International 3-pin.

MIC 18



£24/19/6

GENERAL PURPOSE MICROPHONE

MIC 35



£2/15/-

substantially flat response from 50 to 5000 c.p.s.

SPECIFICATION

Output level: —55 db ref. 1 volt/dyne/cm².
Cable—approx. 4 ft. of co-axial supplied.
Weight—6 ozs. unpacked, 7 ozs. packed.
Dimensions—microphone only 2½" x 2½" x 1"

MICROPHONE INSERTS



(MIC 32 illustrated)

CRYSTAL MICROPHONE INSERTS

These inserts are available in varying sizes ranging from as small as 15/16" square to 1-13/16" round, with various thicknesses from 7/32" to 9/16". Suitable for every purpose such as hearing aids, public address, tape recording, amateur broadcasting, etc., they have responses from 2250 c.p.s. to 3500 c.p.s. at 5 db to 30 db. Insert can be supplied with or without 10 meg. resistor as required.

MIC 32 insert, £2/15/6; all others, £1/19/6.

TABLE AND STAND MICROPHONE

This omni-directional Microphone is robust in construction, with a pleasing appearance. Vibration, shock or low frequency wind noise will not affect the performance. The low frequency cut-off is dependent on the load resistance. The cut-off is given by the quotation, $F = 80 + R$, where F = c.p.s., R = megohms. An adaptor (floor mounting) is available at low extra cost.

SPECIFICATION

Output level = —50 db ref. 1 volt/dyne/cm².
Output impedance—equivalent to approximately 0.002 uF. (0.8 megohm at 100 cycles).
Frequency response—substantially flat from 40 to 6000 c.p.s.

Recommended load resistance—not less than 1 megohm, dependent on low frequency response.

MIC 22



LAPEL MICROPHONE

MIC 28



£5/19/6

Designed to give freedom of movement, this Microphone is small and non-directional. Housed in a soft moulded rubber case, which gives protection against shock, it is provided with a pin at the rear of the case for pinning to the lapel.

SPECIFICATION

Output level—approx. —55 db ref. 1 volt/dyne/cm².
Recommended load resistance—5 megohms.
Frequency response—level throughout the whole of the audible spectrum.
Capacity—0.0015 uF. at 1000 c.p.s.
Impedance—100,000 ohms at 1000 c.p.s.
Cord—6 ft. shielded cable.
Size—1-9/16" wide x 2¼" long x ¼" thick.

HAND OR DESK MICROPHONE

MIC 33



£6/18/6

This Microphone has been designed for the high quality public address and home recording field. High sensitivity and flat characteristics are obtained by a specially designed acoustic filter. Housed in an attractive plastic case with an unexcelled response for its size and price. Unaffected by vibration, shock or low frequency wind noise. Omni-directional frequency response substantially flat from 30 to 7000 c.p.s.

MICROPHONE INSERTS



(MIC 23 illustrated)

AMPLION (A'SIA) PTY. LTD.

EXCLUSIVE AGENTS:

SYDNEY, AUSTRALIA



AUDIO TRANSFORMERS!

featuring ULTRA-LINEAR!

★ TYPE 921 (921-8: 2 or 8 ohms; 921-15: 3.7 or 15 ohms)

For VALVES:
907, KT66,
etc.
Reliable Conversion
"WILLIAMSON" to U.L.
See "Audio Engineering" of June,
1958.

20 WATTS: 30-30,000 a.p.s.
Primary: 5,000 ohms.
SCREEN TAPS: 10% of Plate Z.
P.R.: Plus or minus 1 db 10-50,000
c.p.s.
Leakage Inductance:
1/2F/1/2F: 15 mH. maximum.
Prim./Sec.: 20 mH. maximum.

★ TYPE 931 (931-8: 2 or 8 ohms; 931-15: 3.7 or 15 ohms)

For VALVES:
6X4, 6X5,
6X6, etc.
See "Radio and Hobbies" of Feb-
ruary, 1958, 17 watts U.L.
Amplifier.

20 WATTS: 30-30,000 a.p.s.
Primary: 4,500 ohms.
SCREEN TAPS: 10% of Plate Z.
P.R.: Plus or minus 1 db 10-50,000
c.p.s.
Leakage Inductance:
1/2F/1/2F: 15 mH. maximum.
Prim./Sec.: 15 mH. maximum.

Manufactured by . . .
A & R ELECTRONIC EQUIPMENT CO. PTY. LTD.
378 ST. KILDA ROAD, MELBOURNE, VIC.

Details from these EXCLUSIVE A & R DISTRIBUTORS!

MELBOURNE & VIC.:
J. H. Magrath & Co.
Fly. Ltd.
Homocrafts Fly. Ltd.
Motor Spares Ltd.
Radio Paris Fly. Ltd.
Warburton Frankl Ltd.

SYDNEY - N.S.W.:
United Radio Distribu-
tors F/L 175 Philip St.
Homocrafts Fly. Ltd.
190 Clarence Street
SOUTH AUST.:
Gerard & Goodman Ltd.
100 Rundle St., Adelaide

QUEENSLAND:
A. E. Harvold,
128 Charlotte St., Bris.
TASMANIA
Homocrafts Fly. Ltd.
230 Elizabeth St., Hobart
WEST. AUST.:
A. J. Wyle Fly. Ltd.
1011 Hay St., Perth

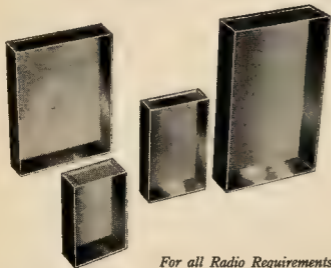
★ Ultra Linear—Output Type
Full power and response all imped.
Type 916—15 watts.
Pr.: 5,000 ohms p.p.s. (with screen tap)
Sec.: 916-3: 2 or 8 ohms; 916-15: 3.7
or 15 ohms.

ALL IN
NEW COLOUR



LOOK FOR THE SILVER-GREY TRANSFORMER

MAKE WORK EASY!



Your metal-ware problems are solved by using ready-made chassis, amplifier, receiver and instrument cases.

Precision made in many sizes, they give your work that professional touch.

CHASSIS SIZES—EX STOCK:

13½" x 7" x 2"	6" x 4" x 2"
8" x 5" x 2½"	6" x 10" x 2½"
11" x 8" x 2½"	13½" x 10" x 2½"
17" x 8" x 3"	17" x 10" x 3"
17" x 12" x 3"	

For all Radio Requirements consult—

GERARD & GOODMAN LIMITED
192-196 RUNDLE STREET, ADELAIDE Phone: W 1541

at the nick of time along comes a letter from one or other of the country areas which saves the day for me. This month I have news of a letter from an area which says that there has been silent for some time in these notes. My correspondent was Wally SDF and he tells me that the area was honored recently by the presence of a worthy President, John SICK, who was on a working visit to the SDF, but unfortunately could not be shown the sights. However, John was very welcome and they hoped that on his next visit he will have time to look at the boys and pump them up on the highly reputed DX conditions that are said to abound in large chunks.

My previous visitor was Clem G64, who did not see many of the DX's, but definitely did see quite a lot of the 50 cycles. He visited the local 30 cycle hatchery and under the leadership of Wally SDF was very impressed with what he saw.

pus and horizontally polarised on Brady's Look-out, which are all over 4,500 ft. in height. These aerials are pointed towards Lancaster and the hearing signals from them are requested to contact 17N or Mr. Bill Ion, of Brionie Park. It is expected that the installation of these aerials on Brady's Look-out and Mr. Dromedary will be carried out later on.

The last general meeting of the zone was a combined meeting held at the home of the new Associates to the zone. At the meeting it was decided to concentrate work on 2 mhz gear for the coming summer. The meeting closed with a few words in honour of the late Murray Richardson, 7MOR, and then adjourned to light refreshments which were extremely satisfactory.

A visit from IAL the other day disclosed some adventures in holiday form in VKI land and now he appears almost broke with only a few pieces of junk to show for his gadding about. Good luck to you, Ken; wish it had been me.

PAPUA—NEW GUINEA

News from VKI this month is somewhat restricted, due no doubt to the fact that the zone has been QRL, or just plain forgetful. The zone has been very busy with work, and likely provides an incentive to others to try their luck, was the fact that Frank 8FN, with nothing better to say, was asked to write a column. He hopefully called CQ. Imagine his surprise when a G station answered his call. To prove it wasn't a fluke, Frank decided to try again and this time he was answered by a PAO. Not satisfied with that, and chafing

his luck, Frank then worked a couple of W stations. Won't be long now, that one will find VKI's dotted throughout the 13 Mc. band during the long winter evenings in the Southern Hemisphere. Most likely see you there Frank one evening soon.

The VKI gang are arranging a Convention, to be held, we believe, in L.A. Appears that some VKIs have expressed their desire to visit the States and where arrangements have been finalised. Perhaps, too, that some of the other stations may be interested. You can be sure that the conviviality and hospitality will be second to none as we do know how to do these things. Lots of arrangements to be made, organising to be done, but details will be made available to all those who may be interested as soon as possible.

This year the VKI gang intend to field a full team in the R.D. Contest. Details are top secret of course, more than your life is worth to divulge them. I can say this though, "All the participating stations intend to work the clock around." Looks like coffee will play a big part in keeping the gang on their feet, or should we say, glued to their chairs. Just watch our smoke! An alarming thought just occurred to yours truly. Should the 13 Mc. band be so full its loss up half way through. An association of ideas no doubt, but what a horrible thought.

SCS has been visiting the Highlands. Heard recently from SCS in W.S. Hope you make it some time soon. I am sure you will. CTR CTR Regulars on the Sunday net: 9FN, SMC, SRW, SDT, BAT, SEB, SQG, SCV, SWP, and SHW. Would like to see you all on the 13 Mc. band. Sunday morning net on 7000 Kc. at 1000 hours. SOS using a cubicque quad on 15 mhz and getting some good reports. Bob also has a 14 Mc. band. Very impressive, too. Ron 8RO due to go on leave

soon and expects to bring back a brand new rig with him from Australia. But 8RW still thumping out a signal with his 4 watts and getting in amongst the W stations. 9BW still in the process of building new rig, but managing to get on for a few days. John 8KZ been QRL with official business lately and unable to devote much time to Amateur Radio.

All for this month gang, but please drop me a line every now and then. I am sure I will be able to make something out of this column.

HAMADS

1/- per line, minimum 3/-.

Advertisements under this heading will only be accepted from individuals who desire to dispose of equipment which is their own personal property. Copy must be received by 8th of the month, and remittance must accompany advertisement. Calculation of cost is based on an average of six words a line. Dealers' advertisements not accepted in this column.

FOR SALE: BC342D Rx, S Meter, N.L. Pwr. Supply, Speaker, £25. Class C Wavemeter set, 2.2. SCRS22 Rx, part mod., £2; Tx incomplete, £1. Type 26 conv., 40-60mc., £1. Command Tx, 3-4 Mc, 30/-; 5-7 Mc, 10/-; Traverse gear, Xtal Cutter, 78 r.p.m., £2. Spring Motor, £1. Pr. 8012, £1; Pr. HK34, 10/-; 3 Klystrons, 15/- lot; 834, £1. Blackwood, 10 Moonlit Tan, Flemington, Vic. FF 3080.

FOR SALE: Hallicrafter's SX62 Receiver and speaker, 540 Kc. to 109 Mc. A.M., F.M., and C.W. Original condition, accept £100. R. H. Hall, 141 Beach Road, Mentone, Vic. XF 4102.

FOR SALE: Xalux 3.5 Mc.—9 Mc., many frequencies, £1 each. S.A.E. for full list. T. R. Naughton, Birchby, Vic.

FOR SALE: 15 tube Edystone 5680/2, £95; Pyral Tape Recorder, model TR-ST1, £80; 3 CR0, £12; ASB4 Receiver partly converted, £4; 109 Mc. 2 Transmitter, £5; Don R Handset, £1; Solar-scope, £1; 0-10 amp. AC Meter, 25/-; 30-30 amp. DC Meter, £2; 12-10 amp. DC Meter, 6/-; 0-200 Oil Pressure Gauge, 6/-; two 866A, £25/-; Crystals in small holders, 3520, 3551, 7060, 7190 Kc., £1 each; Empire Aristocrat Portable Typewriter, £25; Philips Technical Review, Volumes 9 to 15, £1 per vol.; Philips Communication News, Volumes 10 to 13, 10/- per vol.; Philips Manual of Radio Practice, 1947, 14/-; Electrical Engineer Reference Book, £1/10/-; Handbook of Instruction of Wireless Telegraphists, £1/5/-; Electronics Dictionary, 1946, £1; Radiotron Designers Handbook, 4th edition, £1/15/-; Measurements in Radio Engineering, £1/5/-; Wireless Direction Finding, £1/5/-; Encyclopaedia of Radio and Television, 1950, 15/-; Anders Practical Electricity, 15/-; Anders Radioman's Guide, 15/-; Armature Winding, Drunhall, 12/-; Armature Winding and Motor Repair, 15/-; Experimental Radio Engineering, Rapson, 10/-; Frequency Modulation, Rider, 10/-; Radio at U.H.F., R.C.A., 10/-; Radio Location Simply Explained, 6/-; Elementary Trigonometry, Part 1 and 2, 6/-; P. J. Grigg, 3 Philpott St, East Geelong, Vic.

WANTED: A 3BZ Transmitter. J. Beicher, 43 Robert St, Bentleigh, S.E.14, Vic. Phone: XU 2908.

WANTED: Edystone "640" Receiver in good order. R. Fisher, 81 Neerim Rd., Carnegie, Vic. UL 2428.

CORRESPONDENCE

The opinions expressed in these letters are the individual opinions of the writer, and do not necessarily coincide with those of the publishers.

ANSWERS TO VKIWK

Editor "A.R." Dear Sir,

With reference to Tom Mulder's (VKIWK) letter in the June issue, may I use your valuable space to reply?

Mr. Mulder transgresses four of the six clauses in the time-worn Amateurs' Code of Ethics—a code which we Amateurs have assured since the earliest days of Ham Radio.

Number 5 clause reads: "The Amateur is Loyal." I desire to point out that the Uniform Constitution adopted by all States and VKI does not discriminate against Limited Class Licensees. The fact that the VKI Constitution presently discriminates is an act of disloyalty against the Institute as a whole. This is a continuing disloyalty until the VKI Constitution is amended in line with the Uniform Constitution of the profession.

Number 3 clause reads: "The Amateur is Progressive." A change in time (we are now in 1951) requires a change in outlook. Limited Class Licensees of the Ham of today Mr. Mulder wants to discriminate against them because they can't read Morse and can't operate on the lower frequency bands. Such an attitude is unprogressive and should be condemned.

Number 4 clause reads: "The Amateur is Friendly." I condemn Mr. Mulder's attitude as unfriendly and the present Constitution of the VKI Division, barring Limited Class Licensees from full membership, as unfriendly, provocative and likely to cause unrest and schism within the Institute.

Number 6 clause reads: "The Amateur is Balanced." Mr. Mulder is biased against the Limited Class Licensees. The attitude is unbalanced and is unbefitting of a Ham and a gentleman.

I see nothing frightening in the prospect of Limited Class Licensees taking office in the Institute. In fact I can see nothing but good in the suggestion that they should do so. Why it can be imagined that Limited Class Licensees are not to be trusted in office because they can't read Morse or operate on the lower frequency bands, completely beyond me. Such Licensees are just as much Hams as their fellows on the lower frequency bands and discriminate against them is unjust and unwarranted in the extreme.

If friend Mr. Mulder had sat down and thought about the subject a little more, he would not have written in the vein that was published in June.

Tom Mulder would be big in the estimation of Hams if he would be good enough to withdraw his letter, and apologise to the Limited Class Licensees.

—GORDON WEYNTON, VK3XU.

Editor "A.R." Dear Sir,

Being a Limited Licensee, I would like to make a reply to Mr. Mulder's letter in June "A.R."

His main point is the assertion that Limited Licensees are not interested in the h.f. bands. I don't know what the position in the other States is, but here in VKI, the 2 boys I've worked in the morning 8000 mhz are still downed in 40 and 20 etc., and a number of them are working hard for the day when they may transmit on these bands. Working overseas a countryman of mine (and I am sure of it) has a fascination all its own and most Amateurs get the DX bug at some stage of the game. Surely L.L.'s are no exception.

I, and I think many of the other L.L.'s, regard the Limited ticket as a means to an end. Lack of time or some other reason prohibits some keen Associates from passing the theory. They pass the theory and reg. OK (they are probably radio technicians) and so they take out a Limited. Then they may sit for the Morse or the theory and not bother about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before, the morse had to be passed within a year of passing the theory and reg. and the unfortunate student had to start all over again. This point, I think, does away with the possibility of having a Divisional Council, or an F.E. composed of Limited Licensees and not better about the theory or reg. exams. Before,

Homecrafts

PTY. LTD.

AMATEURS'
BARGAIN
CENTRE ★

The New B.J.

PICK-UP ARM

Fits Decca Heads and with Adaptor
fits GP19 and HGP39 Heads.

83/4 plus tax.

TEST EQUIPMENT by ADVANCE of ENGLAND

P1 SIGNAL GENERATOR

100 Kc. to 100 Mc. in six ranges
on fundamentals.

£33/5/- plus tax.

TEST EQUIPMENT by TAYLOR of ENGLAND

MODEL 77A MULTIMETER

20,000 ohms per volt. 24 Ranges.

£26/16/6 plus tax.

CATHODE RAY TUBES

Type 1CP1 1" Tube.

As used in R. & H. Oscilloscope.

78/6 plus tax

Type 5BP1 5" Tube.

As used in R. & H. Oscilloscope.

35/- plus tax.

HOME CRAFTS for all High Quality Audio Equipment: WILLIAMSON AND LEAK AMPLIFIERS WHARF DALE AND BAKER SPEAKERS THORENS MOTORS AND PLAYERS

Vented Enclosures — Speaker Divider Networks

Write for Quotations on anything connected with Hi Fidelity Sound

WINDING WIRE

Now in Stock. 4 oz. Reels.

18 gauge S.W.G. Enamel
20 gauge S.W.G. Enamel
22 gauge S.W.G. Enamel
26 gauge S.W.G. Enamel

2/6 plus tax.

Build your Own CLOCK RADIO

Smith Electric Clock, complete with
wiring diagram.

84/4 plus tax.

SPEAKER TRANSFORMERS

200 ohms to 2 ohms.

1/- each

Rear Bumper CAR AERIALS

20/11

ELECTROLYTIC CONDENSERS

300 uF. 12 volt 5/- doz.

8 uF. 350 volt 1/11 each

SPEAKER TRANSFORMERS

8,000 ohms to 3-7 ohms.

4/11 each

ASSORTED BEZELS

8/- dozen

INSTRUMENT CASES

Sloping front, 9" x 8" x 6".

20/- each

290 LONSDALE STREET, MELBOURNE

FB 3711

SELECTED BULGIN COMPONENTS

FOR THE AMATEUR & EXPERIMENTER



For over 25 years, the name BULGIN has been known and trusted for the manufacture of high grade components that give reliable and completely satisfactory performance.

THESE EXTRACTS FROM THE BULGIN CATALOGUE ARE OF VITAL INTEREST TO YOU.



P500

P500—Shielded Telephone Plug. Particularly suitable for Microphone connections where screening is important.



LIST No P 340

P340—This component is typical of a series of Mains Connectors in the Bulgin range. P340 consists of three poles and has a capacity of 3 amps. at 250v. or 6 amps. at 6v. and is an ideal chassis connector.



P360

P360—A miniature Mains Connector of 3 pins rated at 1.5 amps. at 250v. and 3 amps. at 6v. tested at 1kv. peak. All metal parts silver plated. Poles up to six also available.



P38

P38—Miniature Telephone Jacks. Ideal for Ham work, hospitals, schools, etc., where inter communication is required.



J13

J13—This is typical of the very wide range of Bulgin Panel Jacks offering numerous combinations of contacts. All contacts and switching leaves are of high grade nickel silver contacts. An outstanding feature of Bulgin Jacks is the high quality nickel and silver plating employed.



D673

D673—Latest miniature Lilliput Lampholder of extremely small dimensions for miniaturised or mobile equipment where indicator current consumption must be kept to the barest minimum. Colour range as for D162. Special Lilliput Edison screw lamps can be supplied for use with this Lampholder.



J2

J2 and J6—Standard Jacks for Headphones, Loudspeakers, and Microphones where miniaturisation is essential. J2 is an open circuit and J6 a closed circuit Jack, both of which will take P509 and P38 Plugs.



J6

D162—A typical example of the hundreds of types of signal bush fittings obtainable in the Bulgin range. Front Bezel is heavily chrome plated offering very attractive appearance. Stock colours are red, green, blue, amber and clear.



D162



D180

D180—Typical example of the Bulgin range of low voltage E.M.S. and M.B.C. Signal Lamp fittings. Full colour range available. Note this fitting is adjustable in height to allow for centring of lamp filament behind lens.

Available from selected wholesale houses throughout Australia. Catalogues and leaflets on various Bulgin Products are available on request.

FACTORY
REPRESENTATIVES

R. H. CUNNINGHAM PTY. LTD.
118 WATTLETREE ROAD, ARMADALE, S.E.3, VIC.
and 184 VICTORIA ROAD, DRUMMOYNE, N.S.W.